



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

LANE

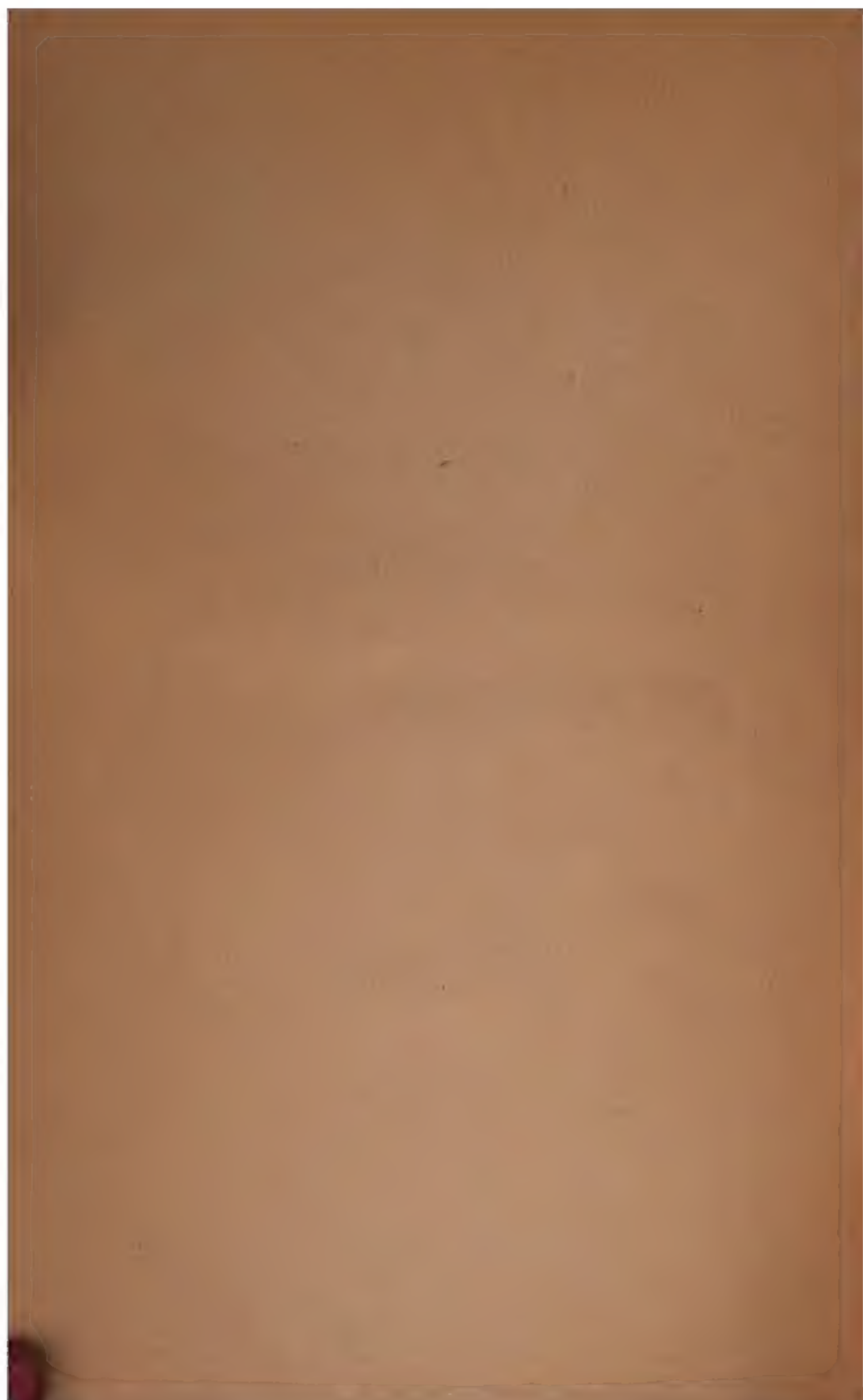
MEDICAL



LIBRARY

In Memory of
Dr. Judson A. Holland







DISEASES

OF THE

NOSE AND THROAT

BY

J. PRICE-BROWN, M.B., L.R.C.P.E.

**MEMBER OF THE COLLEGE OF PHYSICIANS AND SURGEONS OF ONTARIO; LARYNGOLOGIST TO THE TORONTO
WESTERN HOSPITAL; LARYNGOLOGIST TO THE PROTESTANT ORPHANS' HOME; FELLOW OF THE
AMERICAN LARYNGOLOGICAL, RHINOLOGICAL, AND OTOLOGICAL SOCIETY; MEMBER
OF THE BRITISH MEDICAL ASSOCIATION, THE PAN-AMERICAN MEDICAL
CONGRESS, THE CANADIAN MEDICAL ASSOCIATION, THE
ONTARIO MEDICAL ASSOCIATION, ETC., ETC.**

**Illustrated with 159 Engravings, including 6 Full-page
Color-plates and 9 Color-cuts in the Text,
many of them Original**



PHILADELPHIA, NEW YORK, CHICAGO
THE F. A. DAVIS COMPANY, PUBLISHERS

1900

;

COPYRIGHT, 1900,
BY
THE F. A. DAVIS COMPANY.

[Registered at Stationers' Hall, London, Eng.]

Philadelphia, Pa., U. S. A.:
The Medical Bulletin Printing-house,
1911-16 Cherry Street.

YVA391 3MAJ

294
700

IN RECOGNITION OF HIS UNTIRING ENERGY IN THE
INVESTIGATION OF SCIENTIFIC TRUTH

AND

HIS EMINENT SERVICES IN THE ADVANCEMENT OF

LARYNGOLOGY AND RHINOLOGY

THIS VOLUME

IS

AFFECTIONATELY DEDICATED

TO

PROF. E. L. SHURLY, M.D.,

BY

HIS SINCERE FRIEND :

THE AUTHOR.

J. A. Holland, M.D.

85000

PREFACE.

IN adding one more to the long list of works that have been published upon diseases of the nose and throat the author is aware that he has undertaken neither a light nor an irresponsible task; and were it not for the fact that there is a professional field in a large measure still unoccupied he would not have ventured to present to the medical public another volume upon this subject.

As a practitioner who for nearly twenty years was engaged in general practice, and who for the last ten years has devoted himself exclusively to nose-and-throat work, he has frequently been struck with the small amount of knowledge possessed by the profession at large upon the diseases of these important organs. Patients are sent to the specialist of acknowledged skill, by physicians of towns and cities far remote from the residence of the specialist himself. But these patients are the fortunate few: those who have comfortable homes with all that good food, kind friends, and hygienic surroundings can do to restore them to health, as well as means to pay the specialist whose services they require. What about the larger number? the impecunious? the poor? those who might pay a small fee for relief from constant suffering, but who are unable to make long journeys, and to meet the obligations required by staying in the city and remunerating the laryngologist for his work? It is for physicians and surgeons who so frequently meet patients of this class and for students preparing for the regular practice of their profession that this book is written.

In this rushing age, when a thousand and one things demand the attention of the busy practitioner, any work of this kind to be of real use must be terse and to the point. At the same time, when the profession is overcrowded, and the physician's fees often small and difficult to collect, a large price for a book is often out of the question. To meet these requirements in a reasonable and candid way has been the author's aim.

In order to do this he has left out certain subjects which are usually considered to belong to this specialty. For this, however, there is ample reason, as some of these are dealt with in works on general medicine, and others in works on ophthalmology and otology. This may be said of descriptive anatomy of the nose and throat, which is touched

upon only so far as it relates to the practical treatment of diseases of these organs. Diseases of the frontal sinus and the lacrymal canal, coming usually under the domain of the oculist, have been left entirely to his care. Still further, diseases of the ear are not spoken of, except to the extent that naso-pharyngeal diseases affect the Eustachian tube. Asthma, too, is discussed more exhaustively in well-recognized works on general medicine than it could be within the limits of these pages, and consequently has not been treated of. In one other point it is hoped the profession will agree with the author, and that is in the exclusion of diphtheria from this volume. The medical literature of the day is full of the subject. Every medical journal of any standing can tell the latest with regard to this disease. Toxins and antitoxins monopolize the attention of the medical world, and yet the exact *status* of one and of the other in regard to the propagation and prevention of disease it may take another half-century to fully and absolutely define.

It is not the author's desire to speak in any way slightly of the importance and interest of these subjects, or of the absolute necessity of investigating to the utmost all that science can advance in reference to this disease. What he wishes to say is that, after taking all the circumstances into consideration, he has acted advisedly in not placing diphtheria upon the list of subjects treated of.

Another reason for limiting this work strictly within certain lines was the desire to enter as fully as space would permit into the many subjects within its range, and to do so in accordance with the results of the most recent scientific investigations, bringing the record of the art and science of laryngology and rhinology down to the immediate present.

Another departure from the ordinary rule in works of this kind has been made. It is one, however, for which, in the minds of most thinkers, the time has arrived. This is the substitution throughout the work of the metrical system of weights and measures for the old Roman, which is gradually losing its grasp among the civilized nations of the world.

In one other point has he strayed from the old and well-beaten way, and that is by entirely leaving out the enumeration of synonyms. In carefully selecting in each case the title that he deemed most appropriate, he trusts that he has made a selection that will be sufficiently distinguishing, and at the same time fully acceptable to the reader.

In conclusion, the author, with much diffidence, offers his compliments to the profession, and he trusts that, in their criticism of his work, they will extend to him that forbearance and kindly interest to which honest labor, however faulty, always looks for its reward.

37 CARLTON STREET,
TORONTO, DECEMBER, 1899.

ACKNOWLEDGMENT.

IN preparing this work for publication the author feels that he is under deep obligation to very many. Having gathered much of his material from books and journals of recent date, he extends to their writers his thanks for the valuable aid with which he has thus been favored. In this he feels that he is particularly indebted to Dr. Bosworth for granting so freely the use of pictures and plates from his most recent work. To Mr. Lennox Browne, also, the author is under the highest obligation, as his kindness has enabled him to place in the present work a long series of illustrations taken throughout from Lennox Browne's fifth edition upon "Disease of Throat and Nose," issued so recently.

Among other authors whose writings he has so freely consulted he might mention particularly Bishop, Casselberry, Delavan, Fraenkel, Gleitsmann, Grant, Grünwald, Heryng, Ingals, Jonathan Wright, Knight, Kyle, Lake, Max Thorner, Myles, Morell Mackenzie, Noland Mackenzie, Roe, Sajous, Semon, Shurly, Wagner, and Zuckerkandl.

In his own city of Toronto he is under obligation to Professor Primrose for the series of frozen sections which he kindly permitted him to obtain from the Museum of the Anatomical Department of the University of Toronto; and to Mr. Arthur Bensley, also of the university, for pictures of pathological sections furnished by the author.

He would also acknowledge his indebtedness to Miss Wrinch for the care and skill with which she prepared many colored and Indian-ink illustrations.

Drs. Amyot, Sweetnam, Caven, Carveth, and Wilson also cordially contributed a share to the pathological work required.

To the F. A. Davis Co. the author owes much for the unfailing promptitude and kindness with which he has always been treated; and for the suggestions and co-operation which they have ever been willing to grant.

METRICAL WEIGHTS AND MEASURES.

AND THEIR

ENGLISH EQUIVALENTS.

- 1 gramme marked thus.....1| equals 15.432 grains.
- 1 centigramme marked thus.. |01 equals $\frac{1}{6}$ to $\frac{1}{7}$ grain.
- 1 milligramme marked thus.. |001 equals about $\frac{1}{65}$ grain.
- 1 centigramme is $\frac{1}{100}$ part of a gramme.
- 1 milligramme is $\frac{1}{1000}$ part of a gramme.
- 1 litre equals 35.2754 fluidounces.
- 1 metre equals 39.37979 inches.
- 1 cubic centimetre, marked 1 c. c., equals 17 minims.

In dispensing, according to the metrical system, all liquids, as well as solids, are supposed to be weighed, and the terms gramme, centigramme, and milligramme only are used.

To facilitate writing prescriptions, it is more convenient to place a perpendicular line between the gramme and the decimal than the ordinary plan of placing a dot to indicate the fractional part.

CONTENTS.

	PAGE
TITLE	i
DEDICATION	iii
PREFACE	v
ACKNOWLEDGMENT	viii
METRICAL WEIGHTS AND MEASURES.....	ix
TABLE OF CONTENTS.....	x
LIST OF ILLUSTRATIONS.....	xvii

SECTION 1. DISEASES OF THE NASAL PASSAGES.

CHAPTER I.—ANATOMY OF THE EXTERNAL NOSE, NASAL PASSAGES, AND ACCESSORY SINUSES.....	3
External nose, 3; nasal fossæ, 3; frontal sinus, 6; sphenoid, 7; ethmoid cells, 7; maxillary sinns, 8; nerves, 11; blood-vessels, 11; glands, 11.	
CHAPTER II.—PHYSIOLOGY OF THE NOSE AND ACCESSORY SINUSES.....	12
Sense of smell, 12; the nose in phoration, 12; the nose in respira- tion, 13.	
CHAPTER III.—INSTRUMENTS USED FOR THE EXAMINATION AND TREAT- MENT OF DISEASES OF THE NOSE AND THROAT.....	15
Electric lamp, 15; head-mirrors, 16; Mackenzie concentrator, 17; nasal speculum, 17; Bosworth's, 18; Shurly's, 18; Goodwillie's, 18; Myles's, 18; Sincrock's, 18; post-rhinal mirror, 19; self- retaining palate-retractor, 19; cotton-applicators, 20; tongue- depressor's 21; atomizers, 22; insufflators, 23; post-nasal syringes, 23; compressed-air apparatus, 23; nasal saws, 24; chisels, 25; drills, 26; cold-wire snares, 26; galvanocautery snares, 27; spokeshaves, 28; punches, 28; curettes, curved scissors, nasal burrs, etc., 28; anterior rhinoscopy, 29; posterior rhinoscopy, 30.	

DISEASES OF THE NOSE.

CHAPTER IV.—ACUTE RHINITIS.....	32
Pathology, 32; etiology, 32; symptomatology, 32; diagnosis, 33; prognosis, 33; prophylaxis, 33; treatment, 34.	
CHAPTER V.—CHRONIC RHINITIS.....	37
Pathology, 37; etiology, 37; symptomatology, 37; diagnosis, 38; prognosis, 38; treatment, 38.	
CHAPTER VI.—PURULENT RHINITIS OF CHILDREN.....	41
Pathology, 41; etiology, 42; symptomatology, 42; diagnosis, 42; prognosis, 63; treatment, 43.	
CHAPTER VII.—HYPERTROPHIC RHINITIS.....	45
Pathology, 45; etiology, 47; symptomatology, 49; diagnosis, 50; prognosis, 51; treatment, 51; operation by chromic acid, 52; operation by galvanocautery-knife, 52; galvanocautery-snare, 54; operation by electrolysis, 55; turbinectomy, 56; electro- cautery-puncture, 57; submucous knife incision, 57.	

	PAGE
CHAPTER VIII.—ATROPHIC RHINITIS.....	58
Pathology, 58; etiology, 59; symptomatology, 60; diagnosis, 61; prognosis, 62; treatment, 62; use of the post-nasal syringe, 63; Gottstein's plugs, 64; treatment by massage, 64.	
CHAPTER IX.—CEDEMATOUS RHINITIS.....	67
CHAPTER X.—FIBRINOUS RHINITIS.....	70
Non-diphtheritic, 70; traumatic membranous rhinitis, 72; question of identity of fibrinous rhinitis with diphtheria, 73.	
CHAPTER XI.—DEFORMITIES OF THE NASAL SEPTUM.....	74
Prevalence of septal deformities among civilized races, 74; rarity of deformities among aboriginal races, 74; examination of Indian skulls, 74; classification of deviations, 75; etiology, 75; views of Zuckerkandl, Roe, Trendelenburg, Mayo Collier, upon causation, 76; symptomatology, 81; diagnosis, 81; prognosis, 82; treatment, 82; by use of saws, 83; knives, 83; burrs, 83; Ingals's method, 83; Loeb's method, 83; by electrolysis, 84; by use of silver tubes, 85; by Watson's method, 86; by use of rubber splints, 88.	
CHAPTER XII.—DISTORTION OF THE COLUMNAR CARTILAGE.....	89
CHAPTER XIII.—PERFORATION OF THE SEPTUM.....	91
Etiology, 91; treatment, 91. Abscess of the septum, 92. Ulceration of the septum, 92.	
CHAPTER XIV.—HAY FEVER, OR VASOMOTOR RHINITIS.....	93
Pathology, 93; etiology, 94; abnormally-sensitive nerve-centres, 94; hyperæsthesia of the peripheral termini, 94; pressure of an irritating agent, 95; the pollen theory, 95; the uric-acid theory, 96; symptomatology, 96; diagnosis, 98; prognosis, 98; preventive measures, 98; treatment, 99; constitutional treatment, 99; treatment of the diseased condition of the nasal passages, 100; treatment of the spasmodic attack, 100. Nasal hydrorrhœa, 103.	
CHAPTER XV.—ANOSMIA; PAROSMIA; FURUNCULOSIS.....	104
Anosmia, 104; parosmia, 105; furunculosis, 105.	
CHAPTER XVI.—EPISTAXIS	106
Pathology, 106; etiology, 106; symptomatology, 106; diagnosis, 107; prognosis, 107; treatment, 107.	
CHAPTER XVII.—RHINOLITHS; FOREIGN BODIES; PARASITES.....	110
Rhinoliths, 110; symptomatology, 110; diagnosis, 111; prognosis, 111; treatment, 111. Foreign bodies, 112; symptomatology, 112; diagnosis, 112; treatment, 113. Parasites, 113; <i>Musca vomitoria</i> , <i>Comptosia maccellaria</i> , 114; symptomatology, 114; treatment, 115.	
CHAPTER XVIII.—NASAL POLYPI.....	116
Pathology, 116; site of attachment, 117; etiology, 118; symptomatology, 119; diagnosis, 121; prognosis, 121; treatment, 122; by snares, 122; by the use of forceps, 125; by electrolysis, 125.	
CHAPTER XIX.—PAPILLOMA	126
Pathology, 126; treatment, 127. Bilateral tumors of the septum, 127; lymphoid variety, 127; erectile variety, 127; treatment, 127.	
CHAPTER XX.—FIBROMA	128
Pathology, 128; etiology, 128; symptomatology, 128; diagnosis, 129; prognosis, 129; treatment, 129. History of a case, 130.	

	PAGE
CHAPTER XXI.—ADENOMA; ANGIOMA.....	132
Adenoma, 132; angioma, 133.	
CHAPTER XXII.—CYSTOMA OF THE NOSE.....	134
CHAPTER XXIII.—CHONDROMA; OSTEOMA.....	136
Chondroma, 136. Osteoma, 136; pathology, 137; etiology, 137; symptomatology, 137; treatment, 137.	
CHAPTER XXIV.—SARCOMA	138
Pathology, 138; etiology, 138; symptomatology, 139; diagnosis, 139; prognosis, 139; treatment, 139.	
CHAPTER XXV.—CARCINOMA	141
Pathology, 141; etiology, 141; symptomatology, 141; diagnosis, 142; prognosis, 142; treatment, 142.	
CHAPTER XXVI.—TUBERCULOSIS	143
Pathology, 143; etiology, 144; symptomatology, 144; diagnosis, 144; prognosis, 144; treatment, 145.	
CHAPTER XXVII.—LUPUS; GLANDERS.....	146
Lupus, 146; pathology, 146; etiology, 146; symptomatology, 146; diagnosis, 147; prognosis, 147; treatment, 147. Glanders, 148.	
CHAPTER XXVIII.—RHINOSCLEROMA	149
CHAPTER XXIX.—SYPHILIS	151
Mucous patch, 151; superficial ulcer, 151; bony necrosis, 151; pathology, 152; symptomatology, 152; diagnosis, 153; prognosis, 153; treatment, 153.	
CHAPTER XXX.—CONGENITAL SYPHILIS.....	155
Symptomatology, 155; diagnosis, 155; prognosis, 156; treatment, 156.	
DISEASES OF ACCESSORY SINUSES OF THE NOSE.	
CHAPTER XXXI.—ACUTE SINUSITIS	159
Etiology, 159; symptomatology, 160; treatment, 161.	
CHAPTER XXXII.—CHRONIC DISEASE OF THE ANTRUM OF HIGHMORE... ..	162
Pathology, 162; etiology, 165; symptomatology, 165; diagnosis, 166; prognosis, 169; treatment, 169; first, by direct irrigation through the ostium, 169; second, by opening through the inferior meatus, 169; third, by removing a tooth and washing through the alveolus, 170; fourth, by opening the canine fossa, 170; fifth, by the combined method, 171. Cyst of the antrum, 174.	
CHAPTER XXXIII.—ETHMOID DISEASE.....	175
Pathology, 175; etiology, 176; symptomatology, 177; diagnosis, 177; prognosis, 177; treatment, 178.	
CHAPTER XXXIV.—SPHENOID DISEASE.....	180
Frontal-sinus disease, 181.	

SECTION II. DISEASES OF THE PHARYNX.

CHAPTER XXXV.—ANATOMY OF THE PHARYNX.....	185
Boundaries, 185; openings into the pharynx, 185; mucous membrane, 189; pharyngeal glands, 190; arteries, 190; veins, 190; nerves, 190; naso-pharynx, 190; faucial tonsils, 191; lingual tonsils, 191.	

	PAGE
CHAPTER XXXVI. — PHYSIOLOGY OF THE PHARYNX.....	193
Division into naso-pharynx and oro-pharynx, 193. the soft palate, 193; tissues of the oro-pharynx, 193; deglutition, 193, physiological functions of the tonsils 194.	
DISEASES OF THE NASO-PHARYNX	
CHAPTER XXXVII. NASO-PHARYNGEAL CATARRH	195
Pathology, 195; etiology, 196. symptomatology, 198. diagnosis, 199, prognosis, 199, treatment, 199	
CHAPTER XXXVIII. ADENOID GROWTHS OF THE NASO-PHARYNX	204
Pathology 204; etiology, 206. symptomatology, 207. general symptoms, 208; external deformities of nose and chest due to the disease, 209; diagnosis, 210. prognosis 210; treatment, 211, general anesthesia during operative treatment advisable with children, 212; relative merits of ether, bromide of ethyl, nitrous oxide, and chloroform, 213. operations by galvanocautery, 214; snares, 214; post pharyngeal forceps, 214; curettes, 215.	
CHAPTER XXXIX. — MYXOFIBROMA OF THE NASO-PHARYNX	217
Pathology, 217; etiology, 218. symptomatology, 218; diagnosis, 219, prognosis, 219; treatment, 219, report of cases 220, 221.	
CHAPTER XL. — FIBROMA OF THE NASO-PHARYNX	223
Pathology, 223; etiology, 223; symptomatology, 224. diagnosis, 224, prognosis 224; treatment, 224	
CHAPTER XLI. MALIGNANT DISEASES OF THE NASO-PHARYNX	227
Sarcoma, 227. pathology, 227. etiology, 227. symptomatology, 227. diagnosis, 227. prognosis, 228; treatment, 228. Carcinoma, 229. Chondroma of the naso-pharynx, 230. Foreign bodies, 230.	
DISEASES OF THE ORO-PHARYNX	
CHAPTER XLII. ACUTE PHARYNGITIS	231
Pathology, 231; etiology, 231. symptomatology, 232. diagnosis, 233, prognosis, 233; treatment, 233, comparison of the values of cocaine and eucaine, 233.	
CHAPTER XLIII. CHRONIC PHARYNGITIS	237
Pathology, 237. etiology, 237. symptomatology, 238. diagnosis, 238. prognosis, 238; treatment 239	
CHAPTER XLIV. — FOLLICULAR PHARYNGITIS	240
Pathology, 240. etiology 240. symptomatology 241. diagnosis, 242. prognosis, 243. treatment, 243	
CHAPTER XLV. — ACUTE TONSILLITIS, OR QUINSY	245
Pathology 245. site of abscess 246; etiology 247. symptomatology, 247. diagnosis 248. prognosis 249. treatment, 249. Question of the time the abscess should be incised 250	
CHAPTER XLVI. DISEASES OF THE UVULA, (EDEMA; ELONGATION	252
(Edema, 252. etiology, 252. symptomatology, 252. prognosis 252. treatment, 252. Elongation of the uvula 253. pathology, 253. etiology 253. symptomatology 254. diagnosis, 254; prognosis, 254. treatment, 255	
CHAPTER XLVII. — RETROPHARYNGEAL ABSCESS	258
Pathology, 258. etiology, 258. symptomatology, 259. diagnosis, 259. prognosis, 260. treatment 260	

	PAGE
CHAPTER XLVIII.—HYPERTROPHY OF THE PALATIAL TONSILS	262
Pathology, 262; etiology, 264; symptomatology, 264; diagnosis, 265; prognosis, 266; treatment, 267, medical, 267, surgical, 267; tonsillotomy, 267; secondary hemorrhage after tonsilotomy, 269; operation by cold wire snare, 270, scissors, 270, cautery, 271	
CHAPTER XLIX. LACUNAR TONSILLITIS	272
Pathology, 272; etiology, 273; symptomatology, 273; diagnosis, 274; prognosis, 275; treatment, 275	
CHAPTER L. PHARYNGEAL MYCOSIS	277
Pathology, 277; etiology, 279; symptomatology, 281; diagnosis, 282; prognosis, 282; treatment, 282	
CHAPTER LI.—HYPERTROPHY OF THE LINGUAL TONSIL	284
Pathology, 284; etiology, 285; symptomatology, 286; diagnosis, 287; prognosis, 287; treatment, 287; operation by galvanocautery, 288; by lingual tonsillotome, 288; by hot or cold snare, 288	
CHAPTER LII. BENIGN TUMORS OF THE PHARYNX	290
Papilloma, 290, fibroma, 290, operative treatment, 291. Adenoma, 291. Dermoid tumors, 292.	
CHAPTER LIII.—TUBERCULOSIS OF THE PHARYNX	293
Pathology, 293; etiology, 293; symptomatology, 294; diagnosis, 294; prognosis, 295; treatment, 295.	
CHAPTER LIV.—LEUCIS OF THE PHARYNX	297
Pathology, 297; etiology, 298; symptomatology, 298; diagnosis, 299; prognosis, 300; treatment, 300	
CHAPTER LV.—SYPHILIS OF THE PHARYNX	301
Pathology, 301, primary, secondary, and tertiary lesions, 301, etiology, 302, symptomatology, 302, diagnosis, 304, chancre, syphilitic erythema, mucous patch, gummy tumors, deep ulcers, cicatricial tissue, 304, 305; prognosis, 305; treatment, 305. Actinomycosis, 306	
CHAPTER LVI. SARCOMA OF THE FAUCES	307
Pathology, 307; etiology, 307; symptomatology, 308; diagnosis, 308; prognosis, 309; treatment, 309. Leukoplakia palati, 310.	
CHAPTER LVII. CARCINOMA OF THE FAUCES	311
Pathology, 311; etiology, 313; symptomatology, 313; diagnosis, 314; prognosis, 315; treatment, 315	
CHAPTER LVIII. NEUROSES OF THE FAUCES	318
Neurosis of sensation, 318; hyperaesthesia, paraesthesia, 318, neuralgia, 318. Neurosis of motion, 319; spasm of the pharynx, 319, paralysis of the pharynx, 319, myopathic paralysis, 319, palate glosso-pharyngeal paralysis, 320, acute bulbar paralysis, 320	
CHAPTER LIX. TONSILLITIS. FOREIGN BODIES IN THE FAUCES	321
Tonsillitis, 321. Foreign bodies, 322; symptoms, 322; prognosis, 323; treatment, 323	

SECTION III. DISEASES OF THE LARYNX

CHAPTER LX.—ANATOMY OF THE LARYNX	327
Anatomy of the cricoid, 327; the thyroid, 328; the arytenoids, 329, the epiglottis, 330, the ligaments, 331, the articulations, 334, the muscles, 335; the arteries, 335, the lymphatics, 335, the nerves, 335; the mucous membrane, 335	

	PAGE
CHAPTER LXI.—PHYSIOLOGY OF THE LARYNX.....	337
Functions of the larynx, 337; respiration, 337; phonation, 338; pitch, 339; intensity, 339; quality, 339.	
CHAPTER LXII.—LARYNGOSCOPY	340
The use of the throat-mirror, 340; examination of the larynx, 340; holding the tongue, 340; view of the vocal cords, 342; position of the epiglottis, 342; picture of the larynx, 343; position of pa- tient in laryngological examination, 344.	
CHAPTER LXIII.—AUTOSCOPY	345
CHAPTER LXIV.—INTUBATION	350
CHAPTER LXV.—TRACHEOTOMY; THYROTOMY.....	354
Instruments required, 354; diseases for which the operation may be required, 354; necessity for anæsthesia, 355; choice of anæ- sthetics, 355; the use of cocaine, 356; the high operation, 357; the low operation, 358; thyrotomy, 358.	
CHAPTER LXVI.—ACUTE LARYNGITIS.....	362
Pathology, 362; etiology, 362; symptomatology, 363; diagnosis, 363; prognosis, 364; treatment, 364.	
CHAPTER LXVII.—ACUTE LARYNGITIS OF CHILDREN.....	367
Pathology, 367; etiology, 367; symptomatology, 368; diagnosis, 368; prognosis, 369; treatment, 369.	
CHAPTER LXVIII.—ACUTE (EDEMATOUS LARYNGITIS.....	371
Pathology, 371; etiology, 371; symptomatology, 372; diagnosis, 372; prognosis, 373; treatment, 373.	
CHAPTER LXIX.—SIMPLE EDEMA OF THE LARYNX.....	375
Pathology, 375; etiology, 375; symptomatology, 375; diagnosis, 376; prognosis, 376; treatment, 376.	
CHAPTER LXX.—CHRONIC LARYNGITIS.....	377
Pathology, 377; etiology, 377; symptomatology, 378; diagnosis, 379; prognosis, 379; treatment, 380.	
CHAPTER LXXI.—ATROPHIC LARYNGITIS.....	384
Pathology, 384; symptomatology, 384; diagnosis, 385; prognosis, 385; treatment, 385.	
CHAPTER LXXII.—PACHYDERMIA LARYNGIS.....	387
Pathology, 387; etiology, 387; symptomatology, 388; diagnosis, 388; prognosis, 388; treatment, 389; pachydermia conscripta, 389; pachydermia diffusa, 389. Subglottic chronic laryngitis, 390.	
CHAPTER LXXIII.—PSEUDOMEMBRANOUS LARYNGITIS.....	391
CHAPTER LXXIV.—LARYNGEAL PERICHONDritis.....	393
Pathology, 393; etiology, 393; symptomatology, 393; diagnosis, 394; history of a case, 395; prognosis, 395; treatment, 396. Affections of the cricoarytenoid articulation, 396.	
CHAPTER LXXV.—TUBERCULOSIS OF THE LARYNX.....	398
Pathology, 398; etiology, 399; symptomatology, 399; diagnosis, 400; prognosis, 401; treatment, 402; intralaryngeal surgical treatment, 403; curettement, 403; contra-indications of curette- ment, 403; tracheotomy and laryngotomy, 403.	
CHAPTER LXXVI.—LUPUS OF THE LARYNX.....	406
Pathology and etiology, 406; symptomatology, 407; diagnosis, 407; prognosis, 408; treatment, 408.	

CHAPTER LXXVII	LEPROSY OF THE AIR PASSAGES	410
	Leprosy of the nose, 411. Leprosy of the mouth and pharynx, 412	
	Leprosy of the larynx, 412; treatment, 414	
CHAPTER LXXVIII	SYPHILIS OF THE LARYNX	415
	Pathology, 415, etiology, 416, symptomatology, 417, diagnosis,	
	417, prognosis, 418; treatment, 418; surgical treatment, 418	
	Congenital syphilis of the larynx, 420	
CHAPTER LXXIX	NEUROSES OF THE LARYNX	421
	Neuroses of sensation, 421. Anaesthesia, hyperaesthesia, paraes-	
	themia, neuralgia, 421, treatment, 421. Nervous aphonia, 422;	
	symptomatology, 422, treatment, 422. Neuroses of motion, 423	
	Spasm of the glottis, 423; etiology, 423, symptomatology, 423,	
	diagnosis, 424, prognosis, 424, treatment, 425. Paralysis of the	
	larynx, 426. Abductor paralysis, 426. Bilateral paralysis, 427,	
	treatment, 428.	
CHAPTER LXXX	NON-MALIGNANT TUMORS OF THE LARYNX	429
	Papilloma, 429, fibroma, 429; cystoma, 430, lipoma, 430, an-	
	gioma 430; symptomatology, 430 diagnosis, 431; prognosis,	
	432, treatment, 432. Enchondroma, 433; multiple papillomata	
	of children, 434; treatment by tracheotomy, 434.	
CHAPTER LXXXI	MALIGNANT TUMORS OF THE LARYNX	436
	Pathology, 437, symptomatology, 437; diagnosis, 438; prognosis,	
	438; treatment, 438, endolaryngeal operation, 439, laryngec-	
	tomy by Solis Cohen operation, 440, Delavan's rules for guid-	
	ance, 440; Middlemas Hunt's case, 441.	
CHAPTER LXXXII	FOREIGN BODIES IN THE LARYNX	442
	Symptomatology, 443, diagnosis, 443; prognosis, 444, treatment,	
	445.	
CHAPTER LXXXIII	ROENTGEN RAYS IN LARYNGEAL SURGERY	447
CHAPTER LXXXIV	OPERATIONS FOR NASAL DEFORMITIES	449
	Annandale's operation, 450; Ellet's operation, 450, Roe's subcuta-	
	neous operations, 451.	
CHAPTER LXXXV	OPERATIONS FOR CLEFT PALATE	454
	Staphylorrhaphy, 455; MacDonald's operation, 455. Uranoplasty,	
	456; Ferguson's operation, 456; Mason Warren's method, 456;	
	Brophy's method 457 before operation, 457, operation, 458;	
	after operation 458. Owen's opinion, 459	
INDEX TO LITERARY REFERENCES		461
GENERAL INDEX		464

LIST OF ILLUSTRATIONS.

FIG.	PAGE
1. Cartilages of the nose seen in profile.....	4
2. Sagittal section of skull, just to the right of the septum, showing right nasal fossa.....	5
3. Anterior section of the nostrils.....	6
4. The posterior rhinoscopic image.....	7
5. Frozen section of head of adult (color-cut).....	9
6. Phillips's electric photophone, with adjustment for focusing light..	15
7. Head-mirror	16
7a. Head-mirror in position.....	16
8. Laryngoscope, gas-stand, mirror, condenser, and tubing.....	17
9. Bosworth's large and small nasal specula.....	18
10. Goodwillie's nasal speculum.....	18
11. Myles's nasal speculum.....	18
12. Sincrock's nasal speculum.....	18
13. Sincrock's nasal speculum, with handle.....	18
14. Bosworth's nasal speculum, with shield for cautery-work.....	19
15. Shurly's nasal speculum.....	19
16. Post-rhinal mirror	19
17. Post-rhinal mirror	19
18. White's self-retaining palate-retractor.....	19
19. Applicators	20
20. Tongue-depressor	20
21. Tongue-depressor	21
22. Tongue-depressor	21
23. Sass's tongue-depressor.....	21
24. Türck's tongue-depressor	22
25. Davidson's atomizers, to be used by compressed air or hand-bulb....	22
26. Burgess's metal-tube atomizers: straight, up, and down.....	22
26a. Bosworth's atomizer.....	23
27. Compressed-air apparatus.....	23
28. Powder-blower with mouth-piece and tube.....	24
28a. Powder-blower with bulb.....	24
28b. Powder-blower with tubing and bulb.....	24
28c. Powder-blower with scoop.....	24
29. Bosworth's nasal saws.....	25
30. Mial's reversible saw.....	25
31. Hartmann's nasal chisels.....	25
32. Freeman's drill	26
33. Bosworth's nasal polypus-snare.....	26
34. Sajous's nasal polypus-snare.....	26
35. Hall's nasal polypus-snare.....	27
36. Dench's nasal polypus-snare.....	27
37. Universal cautery and snare-handle, with cannula and snare.....	27
38. Cautery-electrodes	27
39. Nasal burrs	28
40. Nasal trephines	28
41. Beren's and Nichols's spokeshaves.....	28

FIG.		PAGE
42.	Anterior rhinoscopy, position of the head for inspecting the wall of the pharynx through the nasal passages.....	29
43.	Posterior rhinoscopic image.....	30
44.	Hypertrophy of middle and inferior turbinals.....	45
45.	Section of inferior turbinated (25 diameters).....	46
46.	Large masses of hypertrophied membrane on the posterior termination of the lower turbinated bones, more or less completely filling the posterior nares.....	47
46a.	Anterior portion of inferior turbinal ($\frac{1}{2}$ -inch objective).....	48
46b.	Posterior portion of inferior turbinal (1-inch objective).....	48
47.	Ballard galvanocautery-battery, with cord, handle, and knife.....	53
48.	Knight's nasal scissors.....	56
49.	Shurly's nasal forceps.....	57
50.	Post-nasal syringe.....	63
50a.	Post-nasal syringe.....	63
51.	Frozen section of the head of a child aged 5 years (color-cut).....	77
51a.	Frozen section of same child, taken two centimetres anterior to Fig. 51 (color-cut).....	79
52.	Section of cartilaginous spur from the nasal septum (25 diameters). ..	84
53.	Silver tubes for septal deformity.....	85
54.	Silver tubes for septal deformity.....	85
55.	Bellocq's cannula.....	108
56.	Rhinolith removed from the left nasal passage of a lady, aged 28, nineteen years after the insertion of the button into the nostril. ..	111
57.	Spoon.....	113
58.	Bosworth's nasal forceps.....	113
59.	Alligator-forceps.....	113
60.	Hartmann's forceps.....	114
61.	Nasal polypi.....	116
62.	Microscopical section of nasal polypus (200 diameters).....	118
63.	Microscopical section of nasal polypus from a child 7 years old....	120
64.	Blake's ear-polypus snare.....	122
65.	Caseous mass washed out of antrum through ostium maxillare....	162
66.	Lateral frozen section through the middle region of the nose (color-cut).....	163
67.	Electric illuminator with flexible shank and cords.....	167
68.	Coronal section of the maxillary sinus, the subject of cystic disease. ..	173
69.	Inflammation of the ethmoid cells, showing glands to right quite normal and those to lower left hand more or less altered.....	176
70.	Sectional view of the pharynx.....	186
71.	Frozen section. Side-view of nose, pharynx, and larynx of child, aged 3 years (color-cut).....	187
72.	The muscles of the soft palate and pharynx: the pharynx laid open from behind.....	189
73.	Infantile adenoids.....	204
73a.	Infantile adenoids (represents a growth quite common).....	204
74.	Stalactite forms.....	205
75.	Microscopical section of hypertrophied pharyngeal tonsil with lymphoid infiltration (20 diameters).....	206
76.	Adenoid forceps.....	213
77.	Adenoid curettes.....	215
78.	Dr. Grant's case of post-nasal polypus.....	217
79.	Uvula-scissors.....	255
80.	Excision of uvula.....	256
81.	Simple hypertrophy of faucial tonsil (57 diameters).....	263
82.	Mathieu's tonsillotomes.....	268
83.	Pharyngomycosis (color-cut).....	277
84.	Leptothrix. Adventitious follicle to left side (color-cut).....	278

LIST OF ILLUSTRATIONS.

xix

FIG.	PAGE
85. Leptothrix <i>in situ</i> ($\frac{1}{8}$ -inch objective; color-cut).....	278
86. Keratosis of tonsil with leptothrix ($\frac{1}{8}$ -inch objective; color-cut)...	279
87. Hypertrophy of the left lingual tonsil.....	284
87a. Bilateral hypertrophy of lingual tonsil.....	284
88. Lingual varix (color-cut)	285
89. Microscopical section of lobe of lingual tonsil.....	286
90. Roe's lingual tonsillotome.....	288
91. Lupus. Palatal appearance.....	297
92. Lupus of lingual tonsil ($\frac{1}{8}$ -inch objective; Ehrlich-Biondi stain; color-cut)	298
93. Lupus of lingual tonsil ($\frac{1}{2}$ -inch objective; Ehrlich-Biondi stain; color-cut)	299
94. Malignant epithelioma, extending from right tonsil to base of tongue	311
95. Stratified epithelioma of tonsils ($\frac{1}{2}$ -inch objective).....	312
95a. Epithelioma showing cell-nests ($\frac{1}{8}$ -inch objective).....	313
96. Robertson's calculus from right tonsil.....	322
97. The cartilaginous frame of the larynx, with the hyoid bone and ligamentous attachments	328
98. The cricoid, seen anteriorly.....	329
99. The cricoid, upper surface.....	329
100. The cricothyroid muscle, viewed anteriorly.....	330
100a. The voice-box, or larynx, seen from behind.....	331
100b. View of the voice-box, or larynx, cut open from behind.....	331
101. The arytenoid and posterior cricoarytenoid muscles.....	332
102. Side-view of the larynx, showing the interior, the right plate of the thyroid being removed.....	334
103. The laryngoscopic image during respiration.....	338
104. The laryngoscopic image during phonation.....	338
105. Laryngeal and post-rhinoscopic mirrors.....	340
106. The laryngeal mirror in position (Cohen) when held by the left hand	341
107. Position for autoscopy.....	345
108. Autoscope with plate instead of hood.....	346
109. Autoscopic operation	347
110. Tongue-depressor for pharyngoscopy and direct laryngo-tracheoscopy.	348
111. O'Dwyer's intubation-set	350
112. Instruments for intubation.....	351
113. Plated tracheotomy-tube	354
114. Hard-rubber tracheotomy-tube	355
115. Elsberg's tracheotomy-tube	355
115a. Hank's tracheotomy-tube	356
116. Low tracheotomy (color-cut).....	359
117. Thyrotomy (color-cut)	359
118. Bosworth's laryngeal knives.....	373
119. American nebulizer	382
120. Multiple comminutor	383
121. Abscess of cricoid. Larynx opened from behind.....	395
122. Lupus. Laryngoscopic appearance.....	406
123. Lupus of the epiglottis ($\frac{1}{8}$ -inch objective; Ehrlich-Biondi stain; color-cut)	407
124. Lupus of the epiglottis ($\frac{1}{2}$ -inch objective; Ehrlich-Biondi stain; color-cut)	408
125. Leprosy of the tongue and epiglottis.....	413
126. Destruction of epiglottis from syphilitic ulceration.....	415
127. Cicatricial stenosis of larynx, the result of syphilitic ulceration....	416
128. Lennox Browne's hollow laryngeal dilator with cutting-blade.....	419
129. Papilloma of cord during respiration.....	429

FIG.		PAGE
130.	Same during phonation.....	429
131.	Fibroma situated beneath the right vocal cord.....	430
132.	Chondroma of the epiglottis.....	431
133.	Angioma of the left aryepiglottic fold.....	431
134.	Extirpation instruments.....	433
135.	Sarcoma of the larynx, as seen from behind.....	436
136.	Tooth-plate in glottis.....	442
137.	Tooth-plate removed.....	443
138.	Laryngeal polypus-forceps, Mackenzie's, revolving, with three attach- ments.....	444
139.	Laryngeal polypus-forceps, Waxham's.....	444
140.	Laryngeal polypus-forceps, Fraenkel's, cutting-jaw.....	445
141.	Laryngeal polypus-forceps, Mackenzie's, articulated.....	445
142.	Lead plate for nasal arch.....	449
143.	Steel pin for nasal transfixion.....	449
144.	Nasal appliance in position.....	451

SECTION I.

Diseases of the Nasal Passages.

CHAPTER I.

ANATOMY OF THE EXTERNAL NOSE, NASAL PASSAGES, AND ACCESSORY SINUSES.

THE outer nose consists of the visible portion of that organ, composed of bones, cartilages, fibrous tissue, muscles, integument, and mucous membrane. It contains, within, the two vestibulæ, separated from each other perpendicularly by the anterior portion of the triangular cartilage (Fig. 1) and the internal union of the lower lateral cartilages.

The lateral walls are formed by the nasal bones, and the nasal processes of the superior maxillary bones, together with the upper and lower lateral and sesamoid cartilages.

The septum dividing the two nasal cavities from each other is formed directly below the triangular cartilage, already mentioned, by an additional narrow slip of cartilage at the entrance of the nostrils, termed the "columnar cartilage."

The openings of the anterior nares are usually on a lower level than the floor of the nose; and they are also protected by a number of stiff hairs, or vibrissæ, which line the nostrils and the vestibulæ.

The various muscles of the nose are attached to the external walls and are for the purpose of dilation and contraction of the nostrils and for the elevation and depression of the organ.

The nasal fossæ are two cavities about equal in size, extending from the nostrils, or anterior nares, directly backward to the nasopharynx, and entering it by the posterior nares, or choanæ, as they are sometimes called. These cavities vary very much in size, the average depth from before backward in the adult being about 5 centimetres, and the height 3.5 centimetres in the centre of the fossæ. The summit of the vault on each side is only a narrow chink, arching from the front to the back; while the floor runs almost horizontally backward, with a surface varying between 1 and 1 1/2 centimetres in width. The external walls of the passages slant irregularly outward and downward (Fig. 2).

The septum divides the fossæ from each other from front to back. It is formed of the triangular cartilage in front, the perpendicular plate of the ethmoid in the upper portion behind, with the vomer immediately beneath it. In early life the septum usually occupies its natural central position, during youth and commencing maturity it very frequently becomes deflected in some part of its course.



Fig 1—Cartilages of the nose, seen in profile (Sappey). 1, Right lateral cartilage 2, Its anterior border 3, An accessory cartilaginous nucleus attached to the inferior border of the same cartilage. 4, Anterior accessory cartilages remarkable for their ovoidal form and the constancy of their existence 5, External branch of the alar cartilage. 6, Union of this branch with the internal branch 7, 8, 9, Secondary cartilaginous branches added to the external branch of the alar cartilage. 10, Accessory cartilage not constantly found (After Bosworth)

The outer walls of the nasal fossæ are formed from before backward by the nasal, the superior maxillary, the lacrymal, the ethmoid, the palate, and the internal pterygoid plate of the sphenoid. Attached horizontally to this bony wall, arranged from above downward, are three scroll-like bones; the superior, the middle, and the in-

ferior turbinateds. The superior turbinated, descending vertically from the cribriform plate of the ethmoid, is only rudimentary in form. The middle turbinated is larger, and has its origin in the lateral mass of the ethmoid. The inferior turbinated, much larger than the middle

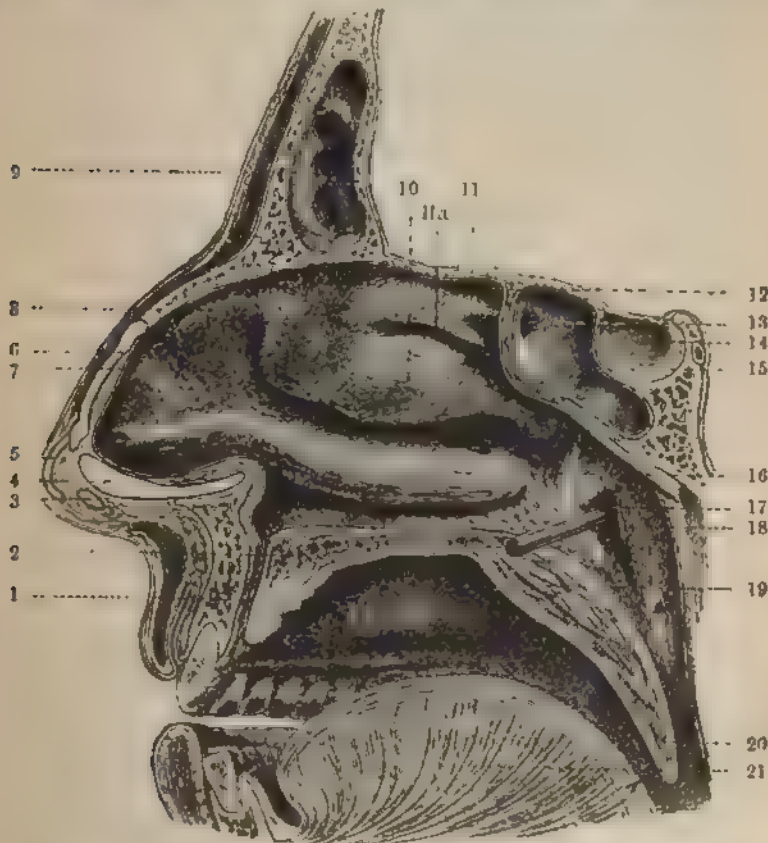


Fig 2 Sagittal section of skull just to the right of the septum showing right nasal fossa. 1, Incisor canal. 2, Hard palate. 3, 4, Parts of median crus of the cartilage of the aperture. 5, Anterior part of the same cartilage. 6, Cartilage of the septum. 7, Groove leading to middle meatus. 8, Agger nasi. 9, Frontal sinus. 10, Inferior ethmoid concha. 11, Superior ethmoid concha. 11a, Superior meatus or ethmoid fissure. 12, Recess of upper meatus. 13, Entrance to sphenoid sinus. 14, Pituitary fossa. 15, Sphenoid sinus. 16, Inferior turbinal (maxillary concha). 17, Rod passed into Eustachian tube. 18, Salpingopharyngeal fold. 19, Soft palate. 20, Uvula. 21, Tongue. (After Lennox Browne, 1899.)

one, extends right through the nasal cavity from front to back along the bony wall, and is attached to the ethmoid, the superior maxillary, the lacrymal, and the palate bones. The space between the superior turbinated and the middle one is called the superior meatus; that between the middle and inferior turbinateds, the middle meatus; and the floor of the passage below the inferior turbinated, the inferior meatus. The roof is formed by the upper portion of the nasal bones in front, and the cribriform plate of the ethmoid behind, the floor by the hori-

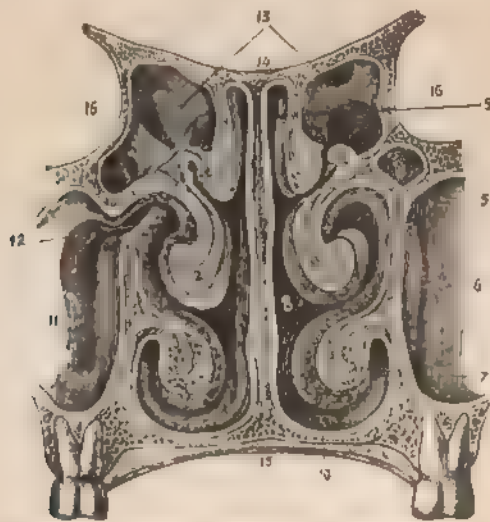


Fig. 3.—Anterior section of the nostrils (Luschka). 1, Septum of the nares at position of tubercle. 2, Middle turbinated body. 3, Inferior turbinated body. 4, Superior turbinated body. 5, Superior meatus. 6, Middle meatus. 7, Inferior meatus. 8, Respiratory portion of the nares. 9, Olfactory portion. 10, Floor of the nares. 11, Cavity of right antrum. 12, Opening from antrum to nostril. 13, Ethmoid cells. 14, Roof of the nasal fossae. 15, Floor of the nasal fossae. 16, Cavity of orbit. (After Lennox Browne, 1899.)

zontal processes of the superior maxillary and palate bones (Figs. 3 and 4)

The accessory cavities or sinuses are the frontal sinuses, the sphenoid sinus, the ethmoid cells, and the antra of Highmore, all opening into the nasal cavities.

Each frontal sinus opens into the corresponding middle meatus by a narrow canal called the infundibulum.

The *sphenoid* sinus is divided into two irregularly-shaped cavities, situated in the body of the sphenoid; they are separated from each other by a thin septum of bone. The canal into each communicates with the superior meatus of the corresponding side. The opening is usually not more than a millimetre in diameter; and the roof, separating the sinus from the brain, not more than two millimetres in thickness (Fig. 5).

This sinus stands alone; and, while it is more difficult to reach, its isolation, fortunately, renders it less liable to disease. The two divisions of the sinus are rarely equal in size; and the septum is frequently to one side of the centre. The ostium on each side is high, although less elevated relatively than the ostium maxillare.

An important feature to remember about the sphenoid sinus is



Fig. 4.—The posterior rhinoscopic image. 1, Septum 2, Middle turbinated bone. 3, Inferior turbinated bone 4, Superior turbinated bone 5, Superior meatus. 6, Middle meatus 7, Inferior meatus. 8, Main passage of nostrils. 9, Vault of pharynx and pharyngeal tonsil 10, Cushion of soft palate. 11, Posterior surface of uvula 12, Ridge formed by levator palati. 13, Salpingo-pharyngeal fold 14, Salpingo-palatine fold. 15, Eustachian prominence or cushion 16, Fossa of Rosenmüller. 17, Eustachian orifice. (After Lennox Browne, 1899)

its near relation to the cavernous sinus and nerves passing into the orbit.

The *ethmoid* cells, situated in the lateral mass of the ethmoid, are irregularly divided into the anterior and posterior, the former opening by minute orifices in the neighborhood of the hiatus semilunaris and the latter into the back part of the superior meatus. These delicate bony cells, strung together like a chain, are distinguished by their thin, paper-like walls, which become more attenu-

ated with advancing years. They form a species of labyrinth, and are almost in direct communication with the orbit, the partition being sometimes perforated from incomplete ossification. The lining membrane is exceedingly thin and practically free from glands (Fig. 3).

The *maxillary* sinus, or antrum of Highmore, is situated in the body of the superior maxillary bone. It is pyramidal in shape and the largest of the accessory cavities—often large enough to hold many grammes of fluid. Each antrum has one opening, situated on the upper portion of the internal or nasal wall, called the ostium maxillare, and located in the middle meatus (Figs. 3 and 5).

This sinus is lined throughout with mucous membrane, closely adherent to the periosteum. This is of the columnar ciliated and chalice epithelium type. Although the antral mucosa is about twice the thickness of that in the other sinuses, yet, like them, it is almost free from glands. What there are, histological examination has proved to be of the tubular variety. The two antra frequently differ in size. Zuckerkandl has found supernumerary apertures in a number of antra; but these are too small to be of physiological importance.

The maxillary antrum differs from the other sinuses in several important particulars: 1. It is very much larger in size. 2. The only opening into it is in the upper portion of the sinus, whereas in the other sinuses the openings are always upon a lower level. 3. It is more prone to early disease, owing to the frequent encroachment of dental caries and also to the absence of dependent drainage.

The lacrymal duct opens into the inferior meatus below the front end of the inferior turbinate.

The mucous membrane of the nasal cavities is continuous with that of the pharynx and the Eustachian tubes, and extends, in turn, to all the accessory sinuses. It is formed in three layers: First, the surface-epithelium, composed of epithelial cells of the columnar variety, extending over the upper half of the septum, and the superior turbinated and part of the middle turbinated bones; and of ciliated cells over the lower part of the septum and the remainder of the turbinal surfaces. Second, the true mucous membrane, composed of white, fibrous, elastic, connective tissue, inclosing within it blood-vessels, smooth muscular fibres, serous and mucous glands, with tubular orifices opening upon the epithelial surface. Third, a sub-mucous layer of connective tissue, very loose in form, and lying directly upon the periosteum and perichondrium of the nasal framework. It is composed largely of venous sinuses studded with tu-



Fig. 5. Frozen section of head of adult. 1, Right and left optic nerves. 2, Sphenoid sinus with posterior wall removed. 3, Sphenoid sinus with posterior wall in position. 4, Left nasal fossa. 5, Nasal septum. 6, Right inferior turbinate bone. (From Pinna's Anatomical Museum, University of Toronto.)

bular mucous glands, and has its highest development over the turbinated bones, particularly upon the middle and posterior portions of them—forming, with the middle layer, the so-called corpora cavernosa nasi. The mucous membrane of the middle and inferior turbinateds differs from the remaining surfaces in this respect: the rich endowment of blood-vessels and muciparous glands enabling them to perform so freely their physiological function. The color of the columnar epithelium, in the mucous membrane of the upper portion of the nose, is yellowish pink; that of the lower, or ciliated, region, from its richer blood-supply, is reddish pink; while the posterior ends of the inferior turbinateds, particularly when much swelled, are of a whitish or purplish hue.

The Nerves.—The innervation of the nose is of a double character: the one consisting of the special sense of smell, the other of ordinary sensibility. The former is supplied by the olfactory nerve, which passes by many minute filaments through the cribriform plate of the ethmoid, and is distributed over the upper third of the septum, the superior turbinated, and the upper half of the middle turbinated, terminating in the rod, or olfactory, cells of Schultze, which are considered to be the special terminals of the olfactory nerve-fibres. The latter is abundantly supplied by superior maxillary branches of the trigeminus and the nasal branch of the ophthalmic and some filaments from Meckel's ganglion.

Blood-vessels.—The vascular supply to the frontal sinuses, ethmoid cells, and roof of the nose is derived from the anterior and posterior ethmoidal branches of the ophthalmic. The spheno-palatine branch of the internal maxillary artery supplies the mucous membrane of the turbinateds and septum, while the alveolar branch of the internal maxillary supplies the antrum.

Glands.—The upper, or olfactory, area of the nose is said to be relatively more richly glandular than the lower, or respiratory, area; and one function of the exosmosis being merely to keep the sensory nerve-filaments in a constantly moist condition, these glands are almost solely of a serous character.

CHAPTER II.

PHYSIOLOGY OF THE NOSE AND ACCESSORY SINUSES.

WITHIN the last half-century it was the general impression, even among medical men, that the nose had only one important function to perform, and that was to preside over the sense of smell. Now it is known to perform three important functions, of which olfaction is, perhaps, the least. The others are to give beauty and resonance to the voice and to perform a complex duty in reference to respiration.

THE SENSE OF SMELL.

The sense of smell is produced by infinitesimal particles of odorous bodies being drawn into the nasal cavities during inspiration. They are there dissolved by the nasal mucus and, coming in contact with the terminal filaments of the olfactory nerves, a sense of their presence is at once transmitted to the nerve-centre and their odorous qualities recognized. Dry particles on dry membrane are not perceived by the nerve. Hence the importance of the nasal mucosa being in a healthy moist condition. In the same way the presence of crusts or tumors or foreign bodies within the nasal cavities, by preventing the contact of odorous particles with the sensitive mucosa, mars the full observance of this important function. In order to insure a perfect sense of smell, the nerve itself must be in a healthy condition.

Frequently in prolonged and chronic nasal disease the terminal filaments lose their normal sensibility, and this loss of functional power affects, to a marked degree, the sense of taste, as well.

THE NOSE IN PHONATION.

This organ, in conjunction with the naso-pharynx, has a very important influence upon the formation of the voice. Combinedly they act as a resonance-chamber in which the voice, after passing through the vocal cords, receives its final tone. All vocal sound is

produced by vibrations of a column of air issuing through the glottis. The pitch of tone is regulated by the tension of the cords; the volume, by the force with which the column of air is driven through them; while the character or individuality of the voice itself is dependent largely upon the mouth, pharynx, and the formation of the nasal chambers.

The soft palate has a great deal to do with correct phonation, and, to perform its duties well, should be perfectly free from obstructive lesions, either in the naso-pharynx above or the tonsillar region beneath.

THE NOSE IN RESPIRATION.

The triple function of saturating, cleansing, and heating the air of respiration, as it passes through the nasal fossæ to the throat, is probably the most important of all the duties which Nature has assigned to this organ. It has been proved by experiment, over and over again, that ordinary dry air, containing only a minimum of moisture, becomes saturated as it passes through the nose during inspiration. This added moisture is obtained from the serous exudation of the mucous membrane of the turbinateds. This fluid exudes from the cavernous sinuses, caused by the stimulation of the air as it passes over them, and is slightly diluted by the mucus from the tubular glands. These venous plexuses, which perform so important a function, are named by Zuckerkandl *Schwellkörper*, or swell bodies. In a healthy condition they are fully surcharged with blood, and the serum passes out by transudation, to be absorbed by the air during inspiration.

The amount of moisture thus given off by the healthy nose in twenty-four hours is estimated at about one-third of a litre and, as can readily be seen, plays an important part in the phenomena of normal breathing. To insure this supply of serum, the sinuses of the turbinateds are always filled with blood, yet this hyperæmic condition, normally, is not sufficient to produce stenosis of any part. Everywhere throughout the nose, however tortuous, these narrow passages are open; and the air of respiration becomes saturated while passing through them.

At the same time the air becomes elevated in temperature by contact with the hot, moist walls, being many degrees nearer blood-heat by the time it reaches the pharynx than it was on entering the anterior nares.

Then, also, the air is purified as it passes through the nasal passages. Insects, heavy dust, and minute foreign bodies are largely kept out by the fringe of vibrissæ, which stands guard over the entrance to each nostril. It is, however, the moist nasal mucosa which does the chief part of the cleansing, the myriads of leucocytes and mucous cells acting as phagocytes and destroying the invading hosts of noxious germs as they advance backward from the vestibule. H. L. Wagner says: "The action of these leucocytes does not consist in their total destruction, but in greatly diminishing their activity." Whether the normal mucous secretion is a germ-destroyer or not is still, in some degrees, an open question, pathologists differing upon the subject. Still, one thing is certain, that, whereas the mucus of the vestibule is always loaded with microscopical germs, that in the back parts of the normal nasal passages is almost, if not entirely, free from them. It is possible that a great deal of the cleansing process is due, however, to the oft-repeated efforts of Nature to eject, by forcible expulsion, anything that irritates the nasal passages.

The special function of the large antra of Highmore is probably one of phonation. Filled, as they are, by air when in a healthy condition, with free openings into the nasal chambers, they may give additional vibration and tone to the voice, whether in vocal exercise or ordinary use.

CHAPTER III.

INSTRUMENTS USED FOR THE EXAMINATION AND TREATMENT OF DISEASES OF THE NOSE AND THROAT.

FOR the successful examination and treatment of nasal diseases we require the aid of artificial light, either reflected from an electric lamp placed on the forehead of the surgeon (Fig. 6) or from bright



Fig. 6.—Phillips's electric photophone, with adjustment for focusing light.

light of some kind placed on either side of the patient and reflected, from the head-mirror of the operator, upon the part to be examined (Figs. 7 and 7a).

The ordinary plan, and the one largely adopted by specialists up to the present date, is the latter one. The light should be on a level with the patient's nose, and on a plane a little posterior to it. The surgeon sits immediately in front of the patient, and by adjust-



Fig. 7.—Head mirror.



Fig. 7a.—Head-mirror in position.

ing the head-mirror the focus of light is thrown directly upon the spot to be observed. The advantage of this arrangement is that, by

looking with one eye through the hole in the mirror and with the other past its edge, he entirely escapes any direct rays of the light from falling upon his own retina. The character of the light used is of some importance. An inclosed light in a dark corner of the room is best. The light itself should be bright, clear, and steady, placed, if possible, in a MacKenzie concentrator or one of the more modern forms (Fig. 8). It may be by electricity, gas, or oil. Even a

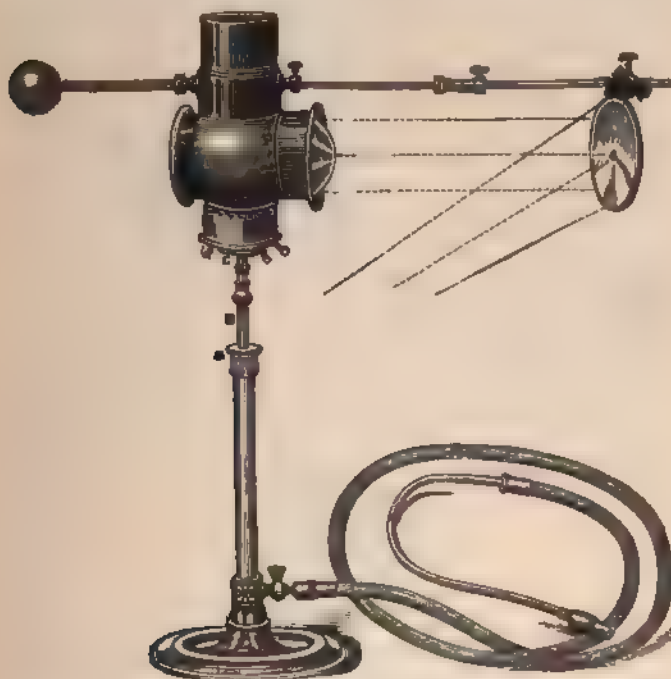


Fig. 8.—Laryngoscope, gas stand, mirror, condenser, and tubing.
(After MacKenzie.)

tallow candle, if nothing better can be obtained, may be of good service.

For anterior rhinoscopy the nasal speculum is required, the object being to open the nostril painlessly to its widest capacity for the admittance of light. Of this instrument there are many varieties, of which Figs. 9 to 13 are samples. Each surgeon must make his own choice. I have found those of an ovoid, cylindrical form much the most convenient, protecting the nostril and admitting abundance of

light. Some like a spring-wire instrument Shurly considers a special protection to the nasal wall opposite to the side operated on to



Fig. 9.—Bosworth's large and small nasal specula.



Fig. 10.—Goodwillie's nasal speculum. Fig 11.—Myles's nasal speculum.



Fig. 12.—Sincrock's nasal speculum.



Fig. 13.—Sincrock's nasal speculum, with handle.

be an essential, and has devised the instrument shown in Fig. 15 for this purpose. Bosworth's Fig. 14 is formed in a somewhat similar manner.



Fig. 14.—Bosworth's nasal speculum, with shield for cautery work.



Fig. 15.—Shurly's nasal speculum.



Fig. 16.—Post-rhinal mirror.



Fig. 17.—Post-rhinal mirror.



Fig. 18.—White's self retaining palate-retractor.

For posterior rhinoscopy posterior rhinal mirrors of small sizes are required (Figs 16 and 17), and, to facilitate post-pharyngeal examination, various palate-retractors have also been introduced (Fig.



Fig. 19.—Applicators.

18). The latter are rarely necessary, as by a little practice on the part of the operator and training on the part of the patient most pharyngeal and post-rhinal cavities can be examined without their aid.

To these might be added cotton-applicators or probes for the



Fig. 20.—Tongue-depressor.

application of solutions and cleansing of the passages (Fig. 19), and tongue-depressors to facilitate examination of the post-nasal region (Figs. 20 to 24).

These instruments are all required for operation as well as examination, and to them might be added the following:—

1. Atomizers to throw spray within the nasal cavities, anteriorly



Fig. 21. Tongue-depressor.



Fig. 22. Tongue-depressor.

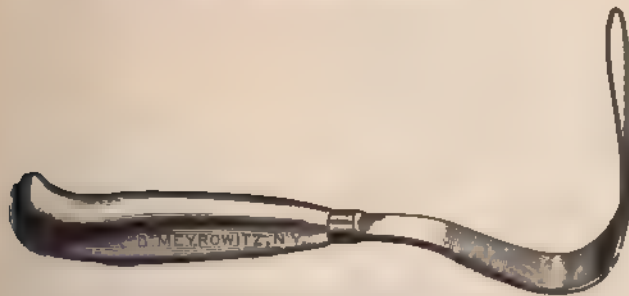


Fig. 23.—Sass's tongue-depressor.

and posteriorly. These may be simple hand-atomizers (Figs. 25 to 27) or they may be driven by compressed air from tanks specially devised for the purpose (Fig. 28).

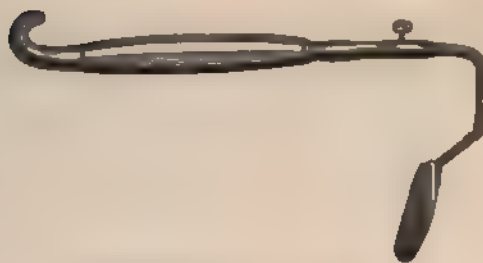


Fig. 24. Turck's tongue depressor.



Fig. 25—Davidson's atomizers, to be used by compressed air or hand bulb



Fig. 26 Burgess's metal tube atomizers: straight, up, and down.



Fig. 26a — Bosworth's atomizer.

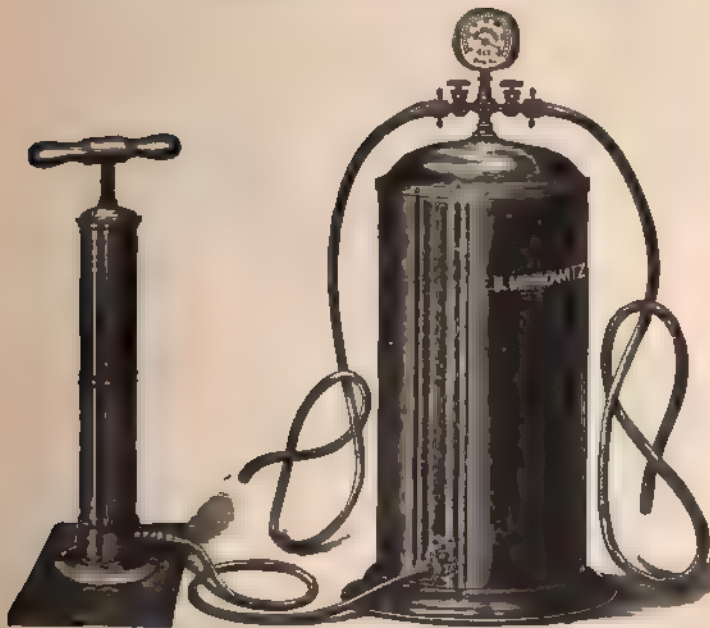


Fig. 27.—Compressed-air apparatus.

2. Insufflators, or powder-blowers, of which also there are many in the market (Figs. 28, 28a, 28b, and 28c). The name is indicative of their utility. Also post-nasal syringes



Fig. 28.—Powder blower with mouth-piece and tube.



Fig. 28a.—Powder-blower with bulb



Fig. 28b.—Powder-blower with tubing and bulb

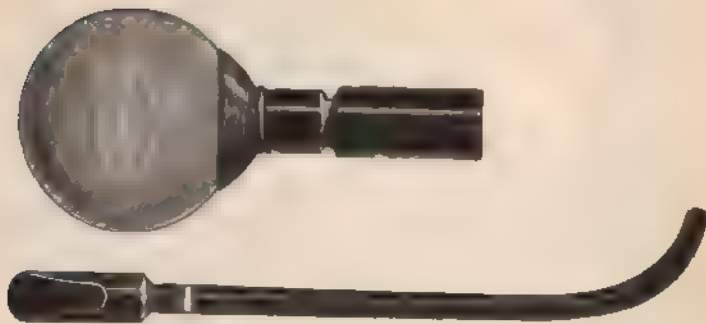


Fig. 28c.—Powder-blower with scoop.

3. Nasal saws, of which Bosworth's is the model upon which most of the others are founded (Figs. 29 and 30). They are used

to remove segments or sections from the nasal septum. Roe's is an excellent instrument for certain well-defined cartilaginous enlargements.



Fig. 29.—Bosworth's nasal saw.



Fig. 30.—Mial's reversible saw.

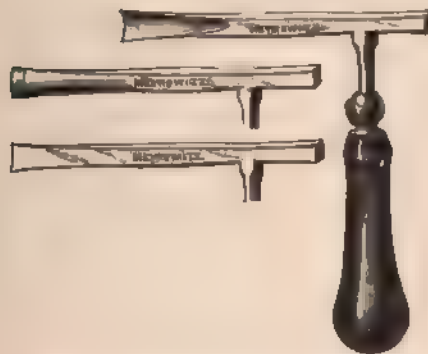


Fig. 31.—Hartmann's nasal chisels.

4. Chisels for the same purpose (Fig. 31); also drills (Fig. 32) and more complicated instruments.

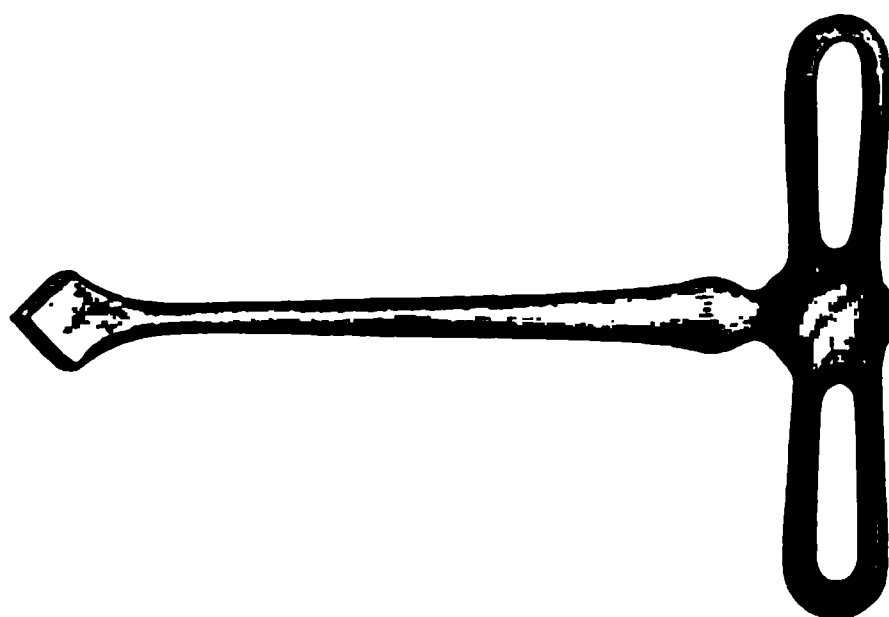


Fig. 32.—Freeman's drill.

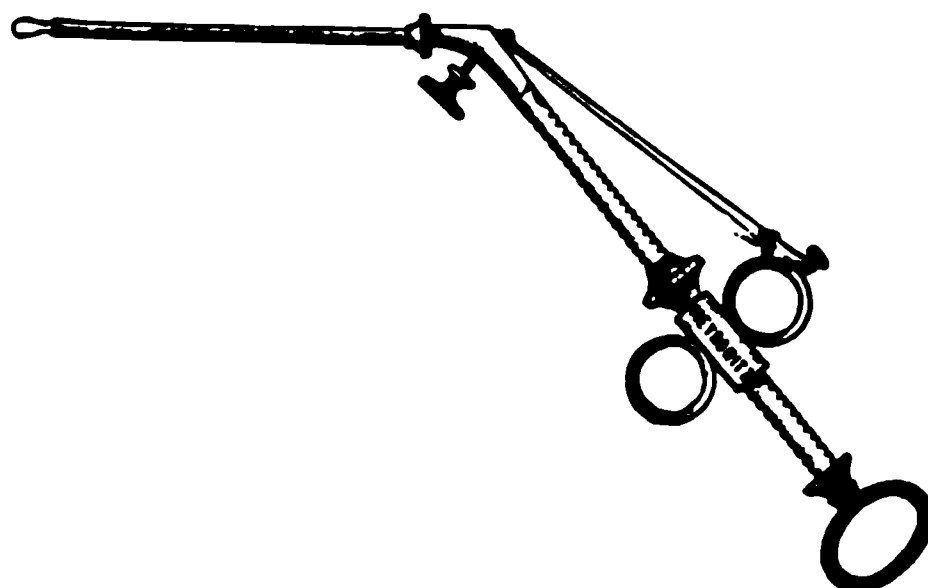


Fig. 33.—Bosworth's nasal polypus-snare.

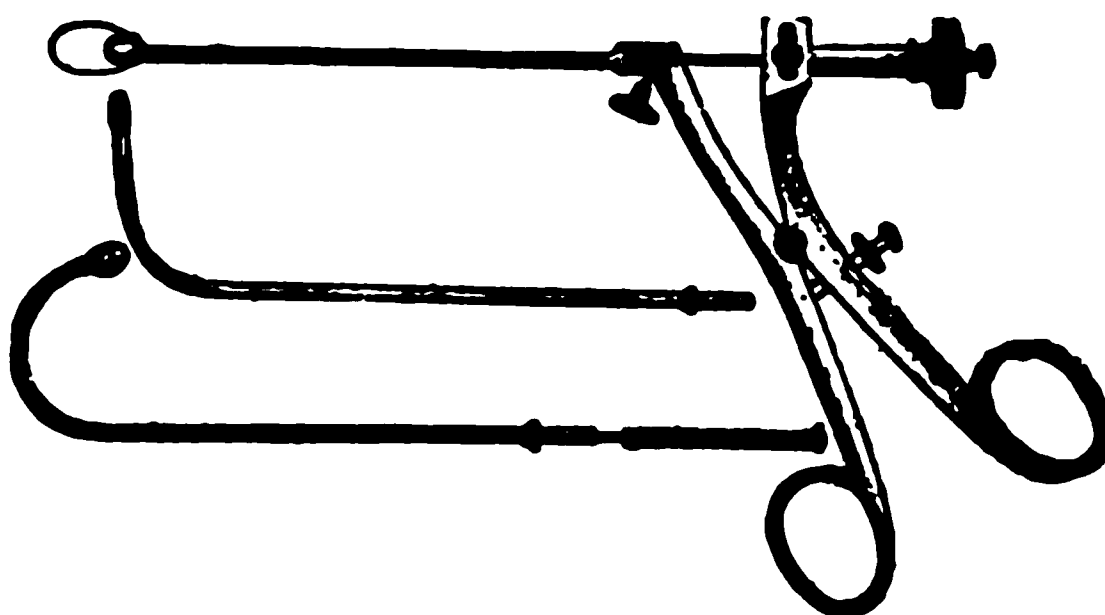


Fig. 34.—Sajous's nasal polypus-snare.

5. Cold-wire snares of many varieties are exceedingly valuable for removal of polypi, as well as other growths within the nasal cavities (Figs. 33 to 36).



Fig. 35. Hall's nasal polypus-snare.



Fig. 36.—Dench's nasal polypus snare.



Fig. 37.—Universal cautery and snare handle, with cannula and snare.



Fig. 38 Cautery-electrodes.

6. The galvanocautery-snare is also received with favor in some quarters (Fig. 37), though much more reliance is placed upon the galvanocautery-knife or trephine for turbinal work (Figs. 38 and 40).

For the latter, Carmault Jones's spokeshave, with various modifications of it, has been received with marked favor in England, while on this continent it has usually not been valued so highly (Fig. 41)



Fig. 39.—Nasal burrs.



Fig. 40 —Nasal trephines (Curtiss.).



Fig. 41 — Beren's (1) and Nichols's (2) spokeshaves.

To the above might be added punches and curettes, curved scissors and knives, forceps and clamps, as well as other instruments spe-

cially devised for use in particular cases. Nasal burrs for antral as well as septal work may also be mentioned (Fig. 39).

ANTERIOR RHINOSCOPY.

The view obtained by means of the rhinoscope, including as it does, the head-mirror (Fig. 7), the reflected light, and the nasal speculum (Fig. 12) is only limited, when confined to one position; but by moving the head in different directions, a greater part of the nasal cavity can be brought successively into view. By looking directly in, the floor of the nose and the inferior turbinated, as well as the



Fig. 42.—Anterior rhinoscopy, position of the head for inspecting the wall of the pharynx through the nasal passages. (After Bosworth)

lower part of the septum, can be seen. The septum is very rarely perfectly central in position, being deflected to one side or the other. In these cases the whole length of the inferior turbinated can frequently be seen, as well as the post-pharyngeal wall, through the wider passage, and if the person examined be requested to count 1, 2, 3, the movements of the palate can also be distinctly observed through the inferior meatus (Fig. 42).

When, owing to the turgid condition of the mucous membrane the passages are too narrow to admit of examination, this can always be aided by spraying the nasal fossæ with a 1-per-cent. solution of cocaine. In a few moments its astringent effect upon the mucous

membrane drives away the blood, and, shrinking the tissues, a better view can be obtained.

In the normal state the middle and inferior turbinateds and septum are of a pinkish hue, while the roof of the nose and the superior turbinateds are yellowish pink.



Fig. 43 Posterior rhinoscopic image (After Bishop.)

POSTERIOR RHINOSCOPY.

To accomplish this, the head-mirror, reflected light, tongue-depressor, and post-rhinal mirror are always required; and sometimes the palate-retractor also (Fig. 18). Fig. 43 illustrates the method of taking a view. Before entering the throat-mirror it is first gently heated to a blood-temperature over a gas-jet or spirit-lamp, to avoid the condensation of moisture upon its surface. Care should be taken,

after depressing the tongue, not to touch the soft parts while passing in the instrument.

To obtain a good view of the posterior nares and vault of the pharynx it is always necessary that the palate should hang straight down. By a little training this can usually be accomplished, although on first efforts the patient is very likely to retract the palate against the post-pharyngeal wall, thus effectually cutting off all view of the vault above. By directing the patient to breathe through his nose the desired result may sometimes be obtained. Of course, when the mouth is opened and the tongue held down by a depressor, it is impossible to breathe alone through the nose; but the attempt drops the palate and gives the required view.

This method failing, a solution of cocaine applied to the palate may remove irritation and produce the desired result. At all events, it will enable a retractor to be applied, and, the velum being drawn forward, a vision is obtained.

In the little post-rhinal mirror we first have the upper surface of the soft palate, then the posterior nares, with the dividing septum; to the two sides, the mouths of the Eustachian tubes and the lateral walls of the naso-pharynx; above the vault, and behind the post-pharyngeal wall, over the two latter we may have the pharyngeal tonsil, or, as it is usually called when in an hypertrophied condition, the adenoids. Between the post-pharyngeal wall, on each side, and the mouth of the Eustachian tube, is the fossa of Rosenmüller.

All these parts cannot be seen at once; and it will require a little care and patience, both on the part of the observer and the observed, with different adjustments of the instrument, to obtain an entire view. The color of the vault is often a dark pink, with lighter hue at the sides and lower portions, while the posterior nares are inclined to be a yellowish pink.

DISEASES OF THE NOSE.

CHAPTER IV.

ACUTE RHINITIS.

THIS is an acute inflammation of the mucous membrane of the nasal passages. It usually affects both sides alike and is attended by coryza or discharge. Frequently the inflammatory action extends to the pharynx; and sometimes, though not very often, to the various accessory cavities and the lacrymal duct.

Pathology.—The commencement of the disease is the period of congestion, with arrest of secretion, and is common, during the first stage, to all inflammations of mucous membrane. This is followed by transudation from the gorged venous sinuses and increased secretion of mucus from the glandular structures. These together urge on the exfoliative processes of the membrane, and leucocytes, as well as epithelial cells, are thrown off in vast numbers, producing mucopurulent discharge during the latter stage of the disease.

Etiology.—The most common cause is exposure to cold. This is particularly the case with susceptible persons. In these the sudden impression of a fall in temperature seems to paralyze the vasomotor nerves of the naso-mucosa; and, the control of the capillary circulation being lost, the membranes become congested. The extent to which this congestion occurs before the inhibitory power is restored would indicate the severity of the disease. In some cases acute rhinitis is caused by exposure to acrid vapors and irritants of one form or another; while in not a few instances it is primarily due to the pre-existence of chronic rhinal disease. It is also one of the early indications of certain of the exanthemata, particularly in the case of measles. Acute rhinitis is more prevalent among children than among adults. Wagner believes that it is often produced by migrations of micro-organisms from diseased tonsils into the nasal cavities.

Symptomatology.—The first symptom is usually that of dryness

of the nostrils, accompanied by more or less frontal oppression and sneezing. There may be chilliness, lassitude, and slight febrile action. The tingling sensation within the nostrils is quickly followed by sero-mucous discharge. The flux may be serous at first, then sero-mucous, and finally muco-pus before the discharge ceases. Usually a certain amount of febrile action takes place.

If the frontal sinuses are affected, frontal oppression and headache are the result, while the extension to the Eustachian tubes and pharynx render symptoms in connection with these organs apparent. Irritation of the conjunctiva, with discharge of tears over the cheek, would indicate that the lacrymal duct was suffering from temporary occlusion.

Sometimes the nasal stenosis is very distressing, necessitating oral breathing. Excoriations of the lips and alæ, by the discharge of acrid secretions, are likewise often productive of much discomfort.

The sense of smell may also be affected during the severity of the attack.

Diagnosis.—The group of symptoms described are so characteristic that diagnosis should be easy. The mucous membrane is at first swelled and red; then bathed in serum; and gradually, as the color becomes lighter, muco-pus takes its place. The posterior choanæ, examined by the rhinoscope, reveal the middle and inferior turbinates swelled, bathed in discharge, and practically filling up the nares. Other mucous membranes involved in the inflammatory action all present a similar pink and swelled condition.

Prognosis.—Favorable in a large majority of cases. It involves no danger to life, and usually disappears in about a week. The real danger lies in allowing colds to follow each other in such quick succession as to prevent the nasal mucosa from resuming its normal tone. Permewan and Carter have also recently drawn attention to the possibility of severe systemic infection being induced by this disease, cases being reported in which prolonged illness and continued fever, otherwise unaccountable, were entirely removed by antiseptic intranasal treatment.

Prophylaxis.—To those inclined to the disease regular habits of life are important. Daily cold bathing either by plunge or sponge, when followed by prompt reaction, is an important preventive. Clothing should be comfortable and equally divided over the body.

Heavy neck wrappings are always objectionable. Heavy furs worn by the ladies while calling and left on in hot rooms often have

the effect of producing cold on returning to the street. Wearing of wet garments, which the exigencies of weather or occupation so frequently render necessary for the time, will rarely during active exercise produce injurious effects, but it is the continued wearing after the exercise is over that does the harm. In short, if people would systematically use good common sense in their daily walk of life, the colds from which so many people suffer would be very much rarer than they are.

Treatment.—Nothing seems to check the general feeling of malaise, attendant upon acute rhinitis, so quickly as quinine in $\frac{1}{2}$ -gramme doses. I prefer to give it in capsule form, repeating the dose each morning while the disease lasts. In strong vigorous adults a gramme might be given to commence with, taking the smaller amount after the first day or two. In young children $\frac{1}{4}$ or $\frac{1}{8}$ gramme, according to age and bodily habits.

A saline cathartic is also beneficial; and the feet put in hot water at bed-time, followed by a stimulating drink of ginger-tea or hot lemonade. The object aimed at is diaphoresis and restoration of the natural equilibrium of the whole body. If there is unrest and wakefulness, with flushed face, acetanilid in $\frac{1}{4}$ -gramme doses might be repeated once or twice during the night-time. For the same purpose minute doses of morphia and atropia in tablet form are often given; the combination has the advantage of the astringent effect of the atropia upon the mucous membrane:—

- | | |
|---|--------|
| 1. R Atropia sulph. | (M) 13 |
| Morph. sulph. | 085 |
| M. Fiat in pil. x dividenda. | |
| Sig.: One to be taken every four or six hours if required | |

For Local Treatment —

- | | |
|--|----|
| 2. R Menthol . | 6 |
| Albolene | 60 |
| M. Sig.: To be used with an atomizer to the nostrils several times a day | |
-
- | | |
|-----------------------------|-----------------------|
| 1. R Atropia sulph. | gr. $\frac{1}{200}$. |
| Morphia sulph. | gr. j |
| M. Fiat in pil. x dividenda | |
| 2. R Menthol | gr. x |
| Albolene | 3ij. |
| M. | |

Or

1. R Thymol	12
Menthol	3
Albolene	60

M. Sig.: To be used with an atomizer to the nostrils several
. times a day.

Either of these will be found an excellent remedy in this disease.

Bishop, in his recent work on "Ear, Nose, and Throat," strongly recommends 3 per cent. of camphor-menthol in lavolin as a spray in acute rhinitis. It has a similar action upon the inflamed mucosa to the ones just referred to.

Lennox Browne, in the new edition of his valuable book on "Diseases of the Nose and Throat," speaks emphatically of the value of menthol in the treatment of diseases of these organs. Speaking of this "remarkable drug," he says: "1. It stimulates to contraction the capillary blood-vessels of the passages of the nose and throat, always dilated in the early stages of the head-cold and influenza. 2. It arrests sneezing and rhinal flow. 3. It relieves pain and fullness of the head by its pain-killing properties. 4. It is powerfully germicide and antiseptic."

All these statements, with the exception of the one referring to sneezing, I have agreed with for years. The sternutatory effort is frequently produced by the first applications of the menthol-spray to the nose; but the mucous membrane soon becomes accustomed to the slight irritation, and subsequent applications will be borne without difficulty.

When the symptoms show tardiness in abating, recovery may often be hastened by using stronger solutions of the stearoptenes in the hydrocarbon menstruum. For instance, the menthol may be doubled or tripled to the same quantity of albolene, and the same may be said of thymol. In this case, however, they should be inhaled directly into the mouth from the atomizer, and, the mouth being closed, exhaled through the nose.

When there is much nasal stenosis, there is sometimes a temptation to use cocaine, owing to its power as an astringent in producing immediate relief. It is unwise, however, ever to place this remedy

1. R Thymol	gr. ij.
Menthol	gr. v.
Albolene	3ij.
M.	

in the patient's hands. The relief it affords is only temporary, and the more frequently it is used, the more rapidly does reaction take place, with return of the swelling. The danger of forming the cocaine-habit makes it imperative to confine the use of this drug to the doctor's office.

After the vascular plethora has passed away and the exudation diminished Bosworth recommends the application of chromic acid to the still swelled membrane. After cocainization he applies minute crystals of the acid to the prominent portions of the inferior turbinates, with the view of pinning down the parts and so securing contraction. Wherever I have found cautery treatment necessary, it has always been in cases in which some previously existing hypertrophy demanded the operative treatment.

Dry heat applied to the forehead is sometimes of benefit in the later stages, relieving the frontal headache and taking away the fullness which so often is felt over the root of the nose.

CHAPTER V.

CHRONIC RHINITIS

THIS is a chronic inflammation of the nasal mucosa bearing a direct relation to the acute disease. Some observers believe it to be the cause of the oft-repeated occurrences of the latter, while others look upon it as the effect. The last mentioned is probably nearer the truth. The entire mucous membrane may be involved, and the disease may extend to the Eustachian tubes, the lacrymal ducts, and, as in the acute disease, to the accessory sinuses.

Pathology.—The mucous membrane is thickened and puffy, while the venous sinuses are chronically relaxed. Interstitial infiltration is the result, but of a changeable character. Frequently will one nasal fossa be affected, closing it sufficiently by œdema to produce complete nasal stenosis, while for the time the other is free enough to carry on respiration. Lying for a short period on the open side will reverse the condition, simply by hydrostatic gravitation. Hydrorrhœa from the venous sinuses, together with the discharge of leucocytes and pus-cells from the chronically-irritated glands, becomes a leading feature.

Etiology.—Continued exposure to inclemencies of the weather—with insufficient clothing, wet feet, etc., producing oft-repeated colds—is a frequent cause. Inhalation of irritating dust and gases, during ordinary occupation, when prolonged, will induce the disease. The presence of a strumous diathesis may be a predisposing cause; as also may be the presence of structural lesions and hypertrophies.

Symptomatology.—The most prominent symptom is a constant nasal discharge, chiefly of a muco-purulent character, which induces oft-repeated efforts at blowing and hawking. In aggravated cases the nares are filled with a pasty, yellow matter; and the constant efforts to void the discharge, in some cases, produce swelling and redness of the nose, as well as eczema or ulceration of the anterior nares. Owing to the limited proportion of serum exuded, the secretion often becomes dry, resulting in crust-formation about the nostrils. To liberate this, picking is resorted to, with gradual destruction of the

mucous membrane, and, in some cases, the septal cartilage eventually becomes perforated by this digital irritation. The disease occurs most frequently between childhood and early maturity.

Diagnosis.—There is sometimes a nice distinction to be made between chronic rhinitis and Bosworth's purulent rhinitis of children. In the former the disease may occur any time after early childhood, but rarely during that period, while in the latter it always occurs during early life. In the former there is less purulent discharge than in the latter, while, owing to the shorter period of its existence, there is less likelihood of its culminating in atrophy. The diagnosis between this and hypertrophic rhinitis is more easily made. The application of a 4-per-cent. solution of cocaine for the time will shrink away the infiltration of chronic disease, which it cannot do with the enlargements arising from hypertrophy. On the other hand, when of long duration, it may resemble and even be the initiatory stage of atrophic rhinitis.

Prognosis.—In the region of the great lakes of this continent chronic rhinitis is very prevalent, owing to the humidity of the atmosphere and the variability of temperature. As these cannot be avoided, the prognosis as to permanent result is not very encouraging. If proper means are adopted, however, a cure can be accomplished, though the tendency to return may still exist. When long continued, the disease is likely to culminate in chronic hypertrophic rhinitis. Consequently a guarded prognosis as to ultimate results should always be given.

Treatment.—Regulation of the *primæ viæ* and toning up the general system are in many cases necessary and can be done on the principles of general medicine.

Locally, the nasal passages will require systematic cleansing. For this, alkaline sprays will be required; and, of these, what is called Dobell's may be considered the best type. All modern English writers on disease of nose and throat acknowledge the utility of Dobell's solution, and give credit to Dobell for introducing it to the world, yet scarcely two of them agree upon its formula. I have before me the most recent works of Sajous, Bosworth, and Bishop, and in giving the formula of Dobell's solution, while they all agree as to ingredients, they all differ as to quantities. Here, I think, lies the intrinsic value of the preparation as a type, the combination remaining intact, while the proportions are varied, according to the judgment of the physician in charge.

My own rendering of Dobell's solution is the following: -

1. R	Sodii bicarb.	2
	Sodii bibor .	2
	Acidi carbol	1½
	Glycerin	15
	Aquam	ad 250
M. Sig	To be used with the atomizer to the nose, as required, several times a day.	

The advantage of this and similar preparations, used freely as sprays to the nose, is that they are both alkaline and disinfectant, acting as solvents to the muco-purulent secretions, which require to be removed.

After cleansing, oleaginous sprays are indicated for their soothing, protective influence upon the mucous membrane. The oil used as a menstruum should be one of the recently-discovered hydrocarbons, as from their mineral origin and chemical composition they can never become foul or rancid. It matters not whether it be liquid vaselin, lavolin, glycolin, albolene, or any other of the many that are in the market, so long as it is pure, colorless, inodorous, and unirritating; but these requirements are essential. The one I have generally used is albolene. The medicament dissolved in the oil should be of a slightly stimulating and antiseptic character. For instance, 1 to 2 per cent. of menthol in albolene, 1½-per-cent. thymol in albolene, 1 to 2 per cent. of eucalyptol in albolene, 1 per cent. of creasote in albolene, or 1 to 2 per cent. of camphor-menthol in albolene. The first and second of these I have used more extensively than the others, the treatments being repeated from one to three times a day.

The treatment of atrophic rhinitis by massage, introduced several years ago by Braun, of Italy, induced me to try it also in simple chronic rhinitis. He used probes with olive-shaped tips; and, passing one into the nostril, guided by head-mirror and nasal speculum, would, by tremulous pressure of the hand, produce vibration over the diseased tissue. The method I have followed, though copied from Braun, has been of a simpler nature, and would be practiced on each visit of the patient for treatment.

1. R	Sodii bicarb	gr. xxx.
	Sodii bibor	gr. xxx.
	Acidi carbol	grt xv
	Glycerin	3iv.
	Aquam	ad 3viij.
M.		

The end of an ordinary nasal cotton-carrier would be wrapped firmly with a small pledget of cotton, the thickness of the temporary tip being made to accord with the width of the crevice in the nasal passage to which it was to be applied. Then the tip would be dipped in albolene, and, after insertion into the nostril, manipulated in accordance with Braun's method. By proper care, combined with gentleness of touch, massage of the whole mucous membrane can be done without the use of cocaine, and with very little discomfort to the patient. With each application the used pledget is stripped off and a new one applied almost in a moment—three or four being required for each nostril at one sitting. After massage a spray of albolene or similar oil is all that is needed.

In a large number of cases this treatment has been attended with very satisfactory results. The usual office-formula has been: 1. Cleansing the nasal fossæ by a free spray of Dobell's solution. 2. Massage of both passages. 3. Application of a spray of albolene to each. For home-treatment the patient has been instructed to use simple cleansing sprays, as required, between the visits to the office for massage—the latter being repeated every second or third day, a few treatments only being required.

Of the two methods, I have looked upon the massage treatment as more effectual than that of simple medication.

In the posterior thickening of the septum, which so frequently occurs in the chronic rhinitis of adult life, we have a combination of œdema with epithelial cell-proliferation. It is usually bilateral, and exists in the form of a perpendicular ridge, a little in front and on each side of the posterior edge of the vomer. The hypertrophy is, in some cases, so great as to seriously interfere with the nasal breathing and to necessitate operative treatment. This is best done by the galvanocautery. After cocaineization the blade is passed into the nostril and, guided by the post-rhinoscopic mirror, the membrane is freely singed. No special after-treatment is needed; and after a week or so, by which time the surface will have healed, the operation can be repeated if required.

CHAPTER VI.

PURULENT RHINITIS OF CHILDREN.

BOSWORTH was the first to clearly and definitely outline purulent rhinitis and to place it on the list of representative nasal diseases. Other writers had spoken of it before, particularly MacKenzie, Stoerck, Fraenkel, and Cohen, but it remained for Bosworth to recognize its full importance and to intimate the position which he believed it to occupy in the etiology of atrophic rhinitis.

Pathology.—As described by him, it is a disease peculiar to the earlier years of childhood, its prominent feature being the chronic discharge of purulent matter from the anterior nares. This discharge is purely local, and not dependent on constitutional diathesis. In the earlier stages there is increased secretion of mucus, with rapid desquamation of epithelial cells. The discharge gradually assumes a purulent form, and after lasting a number of years results in the shrinkage of the turbinated bodies and the development of atrophic disease. In support of this theory Bosworth says: "That in youth the epithelial structures are especially liable to become the seat of diseased action, whereas in adult life this tendency seems to disappear, and in place of it there obtains a tendency to the involvement of the connective-tissue structures. Thus, in the earlier years of life we notice this tendency in the development of enlarged tonsils and follicular disease of the upper air-tract, as well as in the vulnerability of the lymphatic glands, whereas, in adult life, inflammatory changes in the mucous membranes result in true connective-tissue hypertrophy."

Wagner also expresses the same opinion when he says: "During childhood the skin and mucous membranes are more excitable; more prone to disorders of the circulation. The function of the lymphatic glands is prominent in childhood; the quantity of lymph is increased; the lymphatic glands at this time have their greatest development." Hence the tendency during childhood would appear to be toward the abnormal development of glandular, adenoid, and lymphatic tissues in the throat and naso-pharynx, and to proliferation and desquamation of epithelial cells in the nose itself.

Etiology. The literature regarding the etiology is very scant; but, as it occurs in otherwise healthy and rugged children, struma and hereditary syphilis are not considered potent factors in its production. Bosworth ascribes taking cold from unhygienic conditions, and also neglect of the ordinary rules of health, as the only assignable causes.

From my own experience, I believe we frequently have more direct causes, and that the pathological tendencies already referred to as incidental to childhood are sufficient to produce the disease. In many cases that I have seen the purulent rhinitis has been associated with hypertrophy of the faucial and pharyngeal tonsils. These bodies have been so large as to interfere seriously with nasal respiration. In these cases the adenoid enlargement and the epithelial desquamation ran side by side; but, owing to the stenosis, it was impossible for the purulent discharge to make its escape. Like a flowing well, it ebbed out and over the surface, while the retained discharges produced irritation and continued development, as a consequence. That the adenoid enlargement was the real cause of the purulent rhinitis seemed verified by the fact that the removal of the tonsils and adenoids would be followed by cessation of nasal discharge and restoration of normal breathing. Some cases undoubtedly do occur without the co-existence of tonsillar hypertrophy, but the majority that I have seen have, at least, been associated with adenoids. This view is borne out by the experience of Lennox Browne upon the same subject.

Symptomatology.—The chief symptom is the continued discharge of yellow muco-pus from both nostrils. During the night-time considerable quantities flow out and are deposited upon the pillow. On examining the pharynx, the like discharge, perhaps slightly grayer in color, may frequently be seen trickling down behind the soft palate, the yellower color as it exudes from the anterior nares being due to freer oxidation. The blocking of the nostrils necessitates mouth-breathing, which is still further aggravated when adenoids are present.

Fætor is of rare occurrence, except late in the disease, when it is gradually assuming the atrophic form.

Diagnosis.—The continued presence of the anterior nasal discharge is a strong point in diagnosis. Another one is that it is bilateral and odorless. In scrofula and syphilis the discharges are offensive in odor and often are bloody, and accompanied by systemic manifestations indicative of the disease. The presence of a foreign

body or rhinolith would be distinguished by being unilateral and the discharge accompanied by malodor. Sometimes purulent nasal discharges accompany the development of exanthematous diseases; but in these cases the history proves the relationship, and the unpleasant symptoms are short lived.

Rhinoscopic examination anteriorly, after the removal of the discharge, will reveal a slightly swelled and reddish condition of the turbinates and septum, but without ulceration; while, posteriorly, grayish or yellowish-green mucus will be observed in the naso-pharynx.

Prognosis.—Without appropriate treatment the prognosis is bad. There is no danger to life, and it is a self limited disease; but the limit extends over so many years that serious results of a permanent character follow, unless the limit be broken. When adenoids co-exist, they naturally commence to shrink away about the tenth or twelfth year; and with the shrinkage comes freer nasal breathing and drying of the mucosa. But during the years of the purulent rhinitis the epithelial layer has slowly wasted away, and the follicles and mucous glands and venous sinuses have all been involved in the shrinkage, while the relief from the adenoid absorption has come too late to prevent the occurrence of the dreaded atrophy.

In the early stages, however, before the vitality of the mucous membrane has become exhausted, a hopeful prognosis may be given, provided proper treatment is instituted and carried out.

Treatment.—The first step in treatment is to ascertain whether adenoids are present or not. If present, even if not very large, they should be at once removed; as a limited post nasal swelling, coupled with the purulent inflammatory condition, will produce severe stenosis. The removal of these growths has a double effect: First, by direct depletion of the parts by the hæmorrhage resulting from the operation, and, second, by the permanent removal of the obstruction; both of which have the effect of checking the purulent inflammation. Consequently the subsequent treatment which I have found most effective has been of the mildest character, sprays of albolene alone, or of 1 per cent. of menthol in albolene, or $\frac{1}{2}$ per cent. of thymol in albolene, two or three times a day, for a short while, to the nostrils, being all that has been required to effect a cure.

In cases where it is inopportune to operate, or in which an operation is not required, the nostrils should be thoroughly cleansed by the use of a good atomizer several times a day, using either a mild saline or alkaline solution. Dobell's solution to which has been added

$\frac{1}{4}$ per cent. of thymol is an effective cleanser. Of others, 1 per cent. of chloride of sodium in water, or 1 per cent. of chlorate of potassa in water, will either of them do good service, a few drops of glycerin being added to give softness to the solution.

The spraying of the nose should each time be followed by forcible blowing to remove the pus. After this Bosworth recommends spraying with mild astringent solutions for the purpose of controlling cell-proliferations, and he instances the following among others:—

- | | |
|---------------------------|-------|
| 1. R Glycerol tannin | 4 |
| Aquam | ad 30 |
| M. | |
| 2. R Argent. nitrat. | 2 |
| Aquam | ad 30 |
| M. | |
| 3. R Alumnis | 65 |
| Aquam | ad 30 |
| M | |

Although I have often tried them, I have never been favorably impressed by the use of aqueous sprays in this disease. Young children are exceedingly averse to the irritation produced by them. The objection is frequently so great that to secure the successful use of the atomizer the physician is obliged to apply it himself, which is usually impracticable, when it requires to be used more than once a day.

The sprays of hydrocarbons, on the other hand, are so fine and unirritating that they can be borne by the child with impunity, and the parents or guardians can apply them without any difficulty. They possess this advantage, too, that a single preparation will answer all purposes, thus simplifying the treatment. In some cases sprays of albolene or glycolin alone, repeated several times a day, have been sufficient, while in others 1 to 2 per cent. of menthol in the hydrocarbon and $\frac{1}{2}$ to 1 per cent. of thymol in the like menstruum have been required. Other drugs as well—as eucalyptol, oil of caraway, creasote, etc., in small quantities in the neighborhood of 1 per cent.—could also be used to advantage in these only apparently intractable cases. The use of these preparations, however, do not detract from the importance of the removal of obstructive lesions when they exist.

- | | |
|--------------------------|----------------|
| 1. R Glycerole of tannin | 3i to 5j |
| 2 R Argent nitrat. | gr. iii to 5j. |
| 3 R Alumnis | gr x to 5j |

CHAPTER VII.

HYPERTROPHIC RHINITIS.

THIS is a chronic inflammation of the mucous membrane of the nasal passages affecting chiefly the turbinated bodies and occurring most frequently during the early years of maturity.

Pathology.—The mucous membrane of the middle and inferior turbinateds, particularly the latter, is thickened and corrugated (Fig. 44). The surface-epithelium is hypertrophied, sometimes extending

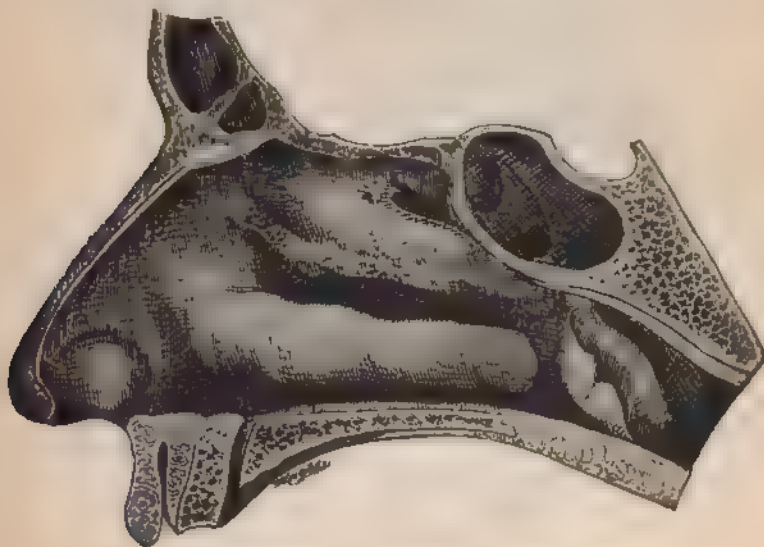


Fig. 44. Hypertrophy of middle and inferior turbinals.
After Bosworth)

in a stratified form into the connective-tissue layer beneath. This second layer is likewise enlarged, owing to proliferation of new tissue-elements, which frequently become fibrous in character. The cavernous sinuses below, together with all the blood-vessels of the mucosa, may become permanently dilated, the glandular elements likewise being affected, the racemose glands having increased in numbers. With all this combined hypertrophy, there is little epithelial desquamation. In advanced stages of the disease new connective

tissue is formed by proliferation from the old connective cells, producing the want of tendency of these hypertrophies to undergo spon-

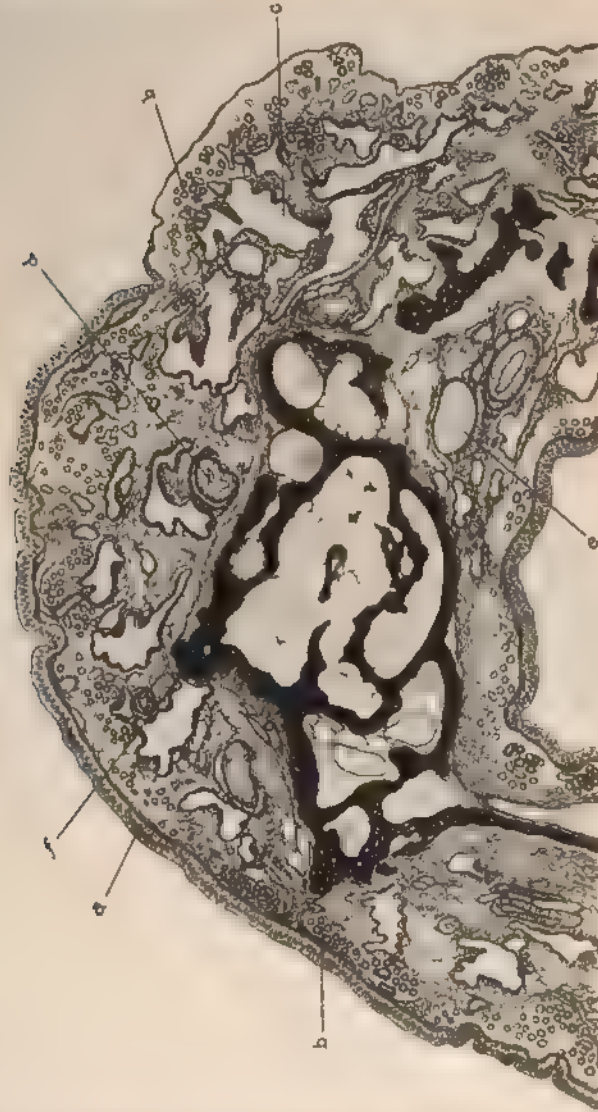


Fig 45 Section of inferior turbinate (25 diameters). *a*, Stratified ciliated epithelium *b*, Glands of submucosa *c*, Sinus of erectile tissue. *d*, Artery *e*, Vein *f*, Hypertrophied turbinated bone (Author's specimen by Benisley)

taneous resolution. In some cases the hypertrophy involves the turbinal bone also, as shown in microscopical section (Fig. 45).

Of the inferior turbinateds, all parts are about equally liable to enlargement, with possibly a predominance of tendency in the posterior end (Fig. 46), while in the middle turbinated it is the anterior end that is usually involved. The Figs. 46a and 46b give histological sections of portions of the anterior and posterior ends of the inferior turbinated.

Etiology.—Anything which will produce continuous partial stenosis in the anterior end of one nostril has a tendency to produce

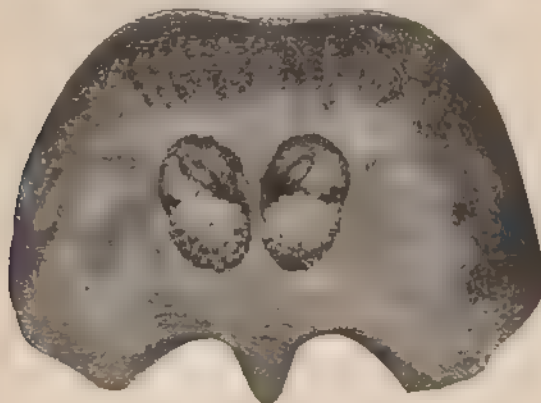


Fig. 46. —Large masses of hypertrophied membrane on the posterior termination of the lower turbinated bones, more or less completely filling the posterior nares. (After Bosworth)

turbinal hypertrophy on the same side. A little consideration will make the reason of this plain. Inspiration of air through the narrowed inlet immediately produces rarefaction behind the obstruction, owing to the forcible manner in which the air is drawn through the passage. This rarefaction means diminished atmospheric pressure, repeated with each inspiration, and, acting on the soft tissues of the turbinateds, it produces a tendency to abnormal congestion.

Consequently any malformation of the front end of the septum, whether of traumatic origin or not, which has the effect of making one nasal passage materially narrower than the other, is likely to cause a gradual, but permanent, enlargement of the turbinal tissues behind it. If, on the other hand, the closure of the passage from septal

deformity is so complete as to produce actual stenosis, there can be no hypertrophy on the affected side; but there may be on the opposite one, owing to the extra labor of inspiration through the single channel

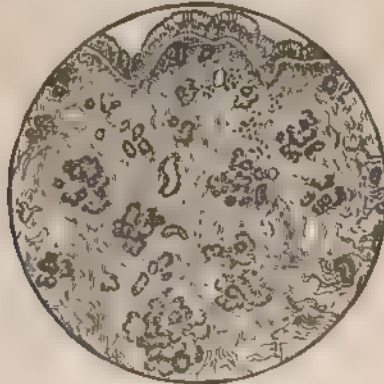


Fig. 46a.—Anterior portion of inferior turbinal ($\frac{1}{5}$ -inch objective).
(After Lennox Browne.)

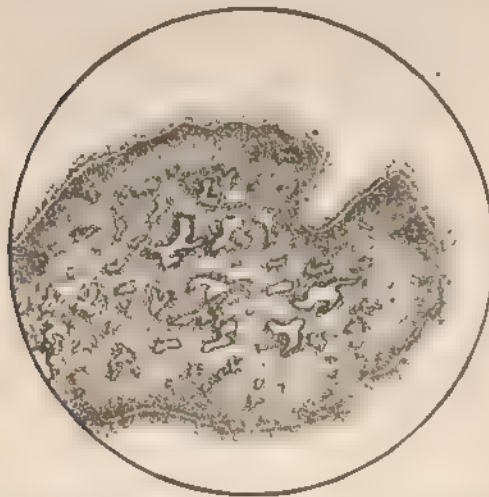


Fig. 46b.—Posterior portion of inferior turbinal (1-inch objective).
(After Lennox Browne.)

Narrowing of the anterior nares by displacement of the columnar cartilage may also produce turbinal hypertrophy in the same way.

There is another cause of this disease which I have not seen mentioned by any author upon the subject, but which I believe is not by any means infrequent, and that is the habit which many a mother has of always laying her child on the same side while sleeping. It is a well-known fact, which any observer can verify for himself, that lying on one side will, in a very few minutes, produce turgescence of the turbinateds of that side, accompanied by comparative anæmia of those in the upper nasal cavity. This is simply the result of gravitation. The turbinal tissues are naturally so lax that the dependent ones, other things being equal, are always congested at the expense of those that are above. By closing the lower nostril the upper one will be found to be doing nearly all the breathing, while closure of the upper one will reveal the fact that little air passes through the one beneath. Reversing the position to the opposite side will further substantiate the same law.

The consequence is that, by persistently placing the child on the one side while sleeping, the mother is continually producing congestion of the same set of turbinateds, forcing the infant to do the greater part of its respiration through the upper nostril. It is only reasonable to conclude that, in a healthy, rapidly-growing child, continual hyperæmia of one set of turbinateds would lead to their hypertrophy. But this is not all; the rarefaction of the air upon the lower side of the soft cartilaginous septum of the infant, with the full pressure of fifteen pounds to the inch on the upper side, will have a tendency to slowly, but surely, deflect it toward the least resistance, thus permanently narrowing the nostril and tending to hypertrophic enlargement.

Quite frequently, hypertrophic rhinitis owes its origin to other causes. Strumous habit may produce it, particularly when attended by injudicious exposure. Sudden changes of temperature oft repeated, particularly when the patient is unwisely or inefficiently clothed, may also give rise to it. Long-continued chronic rhinitis may also, in certain cases, culminate in hypertrophic disease.

Symptomatology.—The most prominent symptom in hypertrophic rhinitis is the obstruction to nasal respiration produced by the enlarged turbinal tissues. Together with this, there will be a change in the normal secretion and its retention to a more or less extent within the nasal cavity. The discharges are thicker and more opaque, owing to lessened exudation of serum and increased secretion of mucus. The difficulty in nasal respiration and the

amount of discharge are both variable, being controlled, to a certain extent, by the temperature and humidity of the atmosphere. In warm dry weather the nasal passages are freer, with less abnormal secretion, while in damp and cold seasons of the year there is greater swelling, increased stenosis, and more profuse muco-purulent discharge. When this occurs, the pharynx also becomes involved, becoming dry and irritable, on account of the oral breathing which has become necessary.

Crusts do not form in this disease, except occasionally around the anterior nares and the front ends of the inferior turbinateds. When they do occur, it is due to the drying effect of the atmosphere, combined with deficient serous effusion from the affected membrane.

There is rarely any odor with this disease. When, however, the dense secretion is retained among the deep crevices for an unusual length of time, mild putrefaction may set in; but the odor is very different from the more offensive one of atrophic rhinitis.

The sense of smell is often notably impaired, owing to occlusion of the nasal chambers. The voice becomes thickened and nasal, while impaired hearing and occlusion of the lacrymal duct may occur as results of the disease.

Headaches may arise from hypertrophy of the middle turbinateds, and in these cases the enlargement is likely to press upon the septum.

Hay fever and asthma are also, in some cases, attributed to it.

Diagnosis.—For this, rhinoscopic examination is necessary. Symptoms may indicate in a general way, but they cannot alone give a positive diagnosis. On examination, the turbinateds will be found to be more or less swelled, and the mucous membrane covering them of a bright-reddish color. A certain amount of muco-pus will always be present. The lower turbinated is usually the most swelled, sometimes almost filling the inferior meatus. The anterior end is the reddest, the color gradually assuming a grayer hue toward the middle and posterior end of the body. The enlargement of the turbinateds is usually somewhat irregular, nodules often standing out prominently in different parts. Occasionally the hypertrophic masses have become united to the septum by bridges or synechiæ of fibrous tissue. This is more likely to occur in hypertrophy of the middle turbinated than of the inferior, owing to its closer proximity to the septum and the greater tendency to enlargement of the anterior end.

The nasal speculum, aided by reflected light and the use of the head-mirror, is always essential to examination. In posterior hypertrophies the post-rhinal mirror reveals the condition, the end

of the inferior turbinate assuming a corrugated, swelled appearance, almost like a white strawberry, and in some cases entirely filling the posterior choana (Fig 46)

In a few instances the posterior hypertrophy has a reddish hue.

Sometimes an oedematous congestion, as in rhinitis oedematosa, might be mistaken for a true hypertrophy; but the application of a 5-per-cent. solution of cocaine will soon remove the doubt. In either case the swelling will be reduced; but in true hypertrophy the reduction will be limited, the abnormal fibrous tissue of the body still leaving it in a swelled condition, while, in the other, the cocaine will soon shrink the oedematous tissue down to even a subnormal state.

Prognosis. Under proper surgical treatment, when the disease is one of simple hypertrophy, the prognosis is always favorable. Without surgical treatment it is a prolonged disease, the ultimate result in many cases being exceedingly unsatisfactory. Not a few writers believe that it is the forerunner of atrophic rhinitis, laying the majority of cases that occur at the door of uncured hypertrophy.

Bishop says that. "After middle age the hypertrophies generally are absorbed and disappear, when this form often becomes merged into atrophic catarrh."

I seriously doubt the correctness of this statement, particularly with regard to age, as the large majority of cases of atrophic disease that have come under my observation have been many years under the period of middle age. It is also generally accepted by rhinologists that atrophic rhinitis has reached its term by middle life, and from that time gradually disappears, or, at least, the distressing symptoms pass away.

Treatment.—The kind of treatment required depends largely upon the extent and severity of the disease. If the hypertrophy be of a mild character, producing only slight stenosis, alkaline sprays, followed by mild astringents, may be all that shall be required. The solutions referred to in the treatment of purulent rhinitis would also be suitable, to which list might be added:—

- | | |
|---------------------|-------|
| 1. R Zinci sulphat. | 2 |
| Glycerini | 2j |
| Aquam | ad 30 |
| M. | |

- | | |
|---------------------|--------|
| 1. R Zinci sulphat. | gr ij. |
| Glycerini . . | .mxxx. |
| Aquam | ad 3j. |

1. R Camphor menthol	...	1
Albolene . . .		.30

M.

The number of cases, however, in which simple spray-treatment will effect a cure is very limited. Patients usually delay seeking advice until permanent hypertrophy has taken place, to remove which operative treatment of one kind or another is required.

For this, two methods of operating are largely in vogue. One is by the application of chromic acid; the other by the use of the galvanocautery. The first has the advantage of cheapness and simplicity of management. The nasal fossa is first sprayed with a 2-per-cent. solution of cocaine. This, in three or four minutes, will produce general shrinkage of the mucous membrane, with the result of widening the fossa. Then a stronger solution—say, 8 to 10 per cent.—may be applied to the turbinated, on a cotton-holder, to remove the remaining sensibility. To apply the chromic acid, first dip the end of a slender bent probe into mucilage; then pick up with it two or three crystals of chromic acid, and hold them in the flame of a gas-jet, until they fuse into a bead on the end of the probe. This cools in a moment and can be applied to the hypertrophic tissue. A small eschar is formed, which in a few days separates, reducing the swelling. The operation can be repeated several times, at intervals, until the required amount of reduction has been accomplished. The chief thing to guard against in using the chromic acid is the possibility of touching other parts while carrying it to and from the diseased tissue. Care in application should prevent any accident of this kind.

The second method, by the use of the galvanocautery, is much more generally followed, particularly by specialists. The chief difficulty is the cost of expensive apparatus; but the advantage lies in the thoroughness of treatment and the nicety and precision with which the operative work can be done. For this purpose the various forms of storage-batteries are usually employed. These can be charged with electricity, at any works where electric light is manufactured, as frequently as the expenditure of the current may require. In towns and cities lit by electricity, transformers can be constructed in connection with the plant, and, when furnished with the requisite resistance-coil, are always ready for use. In urban sections, where storage-batteries cannot be regularly charged, the plunge-batteries

1 R Camphor menthol	....gr	xv
Albolene		5j.

answer a very good purpose. I have latterly used a cautery-transformer connected with the alternating current from the city electric works. It does excellent service, being constantly controllable as well as easily regulated.

In Fig. 47 is shown a Ballard, 4-volt, two-celled storage-battery that I used for years. On the top the metal bars comprise the adjustable volt-selector, by which the current may be made of 2- or 4-volt power. For cautery-work only 2 volts are required; for electric light 4 volts are needed. In front of the battery is seen the rheostat by which the cautery can be regulated from a dull-red to a white heat. Fig. 47



Fig. 47. Ballard galvanocautery battery, with cord, handle, and knife.

also gives a galvanocautery-handle with knife and also shows electric cord. In this case the two cords, for convenience sake, after separate coating, are wrapped together in a single web. As will be noticed, the two ends for attachment to the cautery-handle are separately covered with rubber tubing. This is to positively prevent their touching each other when attached to the battery in circuit, as, should this occur, the instrument might be destroyed by short circuit.

To operate with the cautery-knife successfully requires both care and skill on the part of the operator. The parts should first be thoroughly cocaineized and the nostril opened and protected by a

large-sized speculum (Fig. 13). Shurly's, with its ivory septal protector, is an admirable one for this purpose (Fig. 15). Of others, I like the ovoid the best, as they slip into the nostril and protect the whole circumference. The speculum in position, the cautery-knife is passed into the naris and directly back to the posterior end of the enlargement to be operated upon. The current is then turned on at a bright-red heat and an incision made into it from behind forward. When the turbinal hypertrophy is very large, presenting a round projecting surface, I have usually applied the flat side of the instrument, cutting in pretty deeply. I know this is contrary to the ordinary teaching, but I have found, after the slough has separated, that there has still been abundance of myxomatous tissue and epithelial coating to heal perfectly, without leaving a scar. In doing this care must be taken not to have too wide a blade, and to confine the application to the one width of the flattened surface of the electrode.

On the other hand, when the hypertrophy is less prominent and less enlarged, a slight knife-edge cauterization will produce the best result. It is well in either case not to operate too extensively at one sitting, and we should always be as conservative in our operations as the nature of the case will allow. After operation the passage should be sprayed out with alcohol or glycerin, for its cleansing and protective effect; and a tampon dipped in the same hydrocarbon should be inserted between the cauterized surface and the septum. This will prevent any possibility of adhesion, and it should be left *in situ* for thirty-six to forty-eight hours.

The best method of operating upon large hypertrophy of the posterior end of the inferior turbinated is sometimes a vexed question. Many authorities advise removing the hypertrophy with the cold snare. This done by the slow turning of a Jarvis snare is a tedious and painful process, even after free cocaineization, particularly as it may take from half an hour to an hour to separate the mass. Any severe traction or pulling upon the parts is likely to do serious harm, as, if resorted to, it may loosen the attachment of the turbinated bone itself.

Other authorities advise the galvanocautery-snare as being speedy and effectual. The objection may be urged that the large surface exposed during the operation to the action of the heated wire contains a considerable element of danger, particularly when we remember the close proximity of the growth to the Eustachian tube. When resorted

to, the finger should invariably be passed behind the palate, to adjust the wire and insure the safety of the tube itself.

In my own experience, I have had better results in the treatment of ordinary posterior turbinal hypertrophies by operation with the flat electrode than by any other method. After applying a 10- or 15-per-cent. solution of cocaine freely, I have passed the electrode back through the nostril to the growth, guiding the application of the cautery by the post-rhinal mirror. This sometimes required a little training of the patient; but I would not venture to operate without I could see the point of the instrument clearly reflected in the glass. This being recognized, a firm hand, guided by a knowledge of the anatomy of the parts, should perform the operation without risk. The growth is large and vascular, and, pressing the electrode flatly upon the centre of its inner side, you can burn down deeply into it without producing pain. The one cauterization is all that should be done at one sitting. In this case tamponage is not necessary. It may be followed by swelling, but scarcely enough to touch the septum; and a daily spray of weak solution of cocaine, followed by albolene, will help to keep it open. In three or four days the mass will slough away, and the operation can be repeated carefully at intervals until the turbinated returns to its normal size; but one or two repetitions are all that are ever required, and in some cases a second burning is not needed.

I have never known middle-ear disease to arise from this method of treatment, but I have seen several instances in which tinnitus aurium and slight deafness have been removed by it.

Of course, this method of reducing the hypertrophy should not be attempted by the inexperienced operator. What may be one man's food may be another man's bane, and any individual, by constant practice, may become so skillful in the use of a single instrument as to prefer it to all others in the performance of certain operations.

Helot, of Rouen, recommends the use of electrolysis by the bipolar method for the treatment of posterior hypertrophy. The parts are first cocaineized, and then the electrodes are passed through the anterior naris and inserted side by side into the enlargement. The *séances* last five minutes or more, and are repeated at intervals of several days until the hypertrophic tissue shrinks away.

During the last two years a new method of treating severe cases of this disease has been discussed and practiced by many English and European rhinologists. On this side of the ocean the plan, although

accepted in a modified degree, has not been practiced in its entirety to any great extent. This is operation by turbinectomy, or removal of the turbinated body. The term "turbinotomy" has also been applied indiscriminately to this operation; but as this term, from its derivation, really means simple incision of the turbinated, its use is scarcely appropriate, and consequently should not be applied to the operation at all.

Turbinectomy may be partial or complete, and it is the latter that has been so strongly advocated in certain cases by Carmalt Jones, Dundas Grant, Baber, and others. For this a special instrument has been made: Carmalt Jones's spokeshave, modifications of which are represented in Fig. 41. After cocainization the entire turbinated can be removed by it. Its use is only advocated in extreme cases, where milder operative measures have failed to give the required relief. This severe and radical operation is opposed by many surgeons, par-



Fig. 48 — Knight's nasal scissors

ticularly in America, on account of the important position which the inferior turbinated occupies in normal respiration.

Modified turbinectomy, on the other hand, is accepted by all rhinologists, and, in appropriate cases, is constantly being done. Frequently the anterior end of the middle turbinated, bulging and pressing upon the septum, can be better excised than burned away. And can be removed effectually by means of serrated scissors (Fig. 48). The anterior end of the inferior turbinated, likewise curled upon itself and filling the whole of the inferior meatus, can often be best removed by cutting instruments; and partial turbinectomy in either case would be unattended by the inflammatory swelling which might be expected from extensive cautery operation. The same applies, though in a modified degree, to the posterior end of the inferior turbinated. Fig. 49 shows forceps specially designed for nasal work, the spring closing the instrument, and pressure opening it.

These various operations can be performed under cocaine anaesthesia by means of various instruments, such as curved scissors, knives, punch-forceps, Grunwald's typical method, or even saws properly guarded. I have frequently used the last-named instrument in excising the much-curved anterior end of the inferior turbinated. In Grunwald's operation a notch is cut in the neck of the middle turbinated, or near the central part of the lower turbinated, and the part thus marked off is removed by hot or cold snare.

However well complete or extensive turbinectomy may suit the moist and saline atmosphere of Great Britain, in the drier climate of the United States and Canada it can rarely, if ever, be required. It is quite possible that entire removal would leave such an atrophic condition that the cure would be worse than the disease.

A method of treatment has been advanced by Lennox Browne during the last year which is worthy of more extensive trial. It is



Fig. 49 - Shurly's nasal forceps.

by electrocautery-puncture of the hypertrophic tissues. After cocaineization a sharp needle is passed deeply into the enlargement, parallel with the wall of the fossa. It is left *in situ* at a red heat for a few moments and then removed. By this means, while the mucous membrane is saved, the hypertrophic tissue shrinks. The method I would consider particularly applicable to posterior hypertrophies, special care being taken not to puncture the Eustachian tube.

Still another method of treatment has been proposed by Bryson Delavan, somewhat similar to the last mentioned, the difference being that, instead of cautery-puncture, we have submucous knife-incision. After cocaineization a small bladed ophthalmic knife is passed into the hypertrophic tissue without perforating the opposite side. A slight sweeping movement is made as the knife is brought out of the same opening. Relief is usually prompt and followed by no unpleasant results.

CHAPTER VIII.

ATROPHIC RHINITIS.

This disease has been known for generations by the name of catarrh, being considered as significant of nasal discharge accompanied by foul odor. Catarrh, however, is not a disease, but a symptom, and as a symptom it differs widely, both in character and degree, according to the pathological conditions to which it owes its origin.

Among the many definitions of atrophic rhinitis given by leading authors, I know of none more terse and comprehensive than that of Wyatt Wingrave, who says: "It may be defined as a progressive and persistent form of dry rhinitis, characterized by a shrinkage of the mucous membrane, which tends to invade contiguous chambers, and is accompanied by the formation of crusts, with more or less fetor of a special character."

Pathology. In the atrophic state the normal cilia lining the mucous membrane of the lower half of the nasal fossæ are gradually destroyed. In severe cases this loss of the ciliated epithelium becomes complete and permanent, their place being taken by a layer of flat, squamous, epithelial cells in a state of constant desquamation. Below this the cuboidal epithelium, the adenoid or hyaloid layer, the acinus glands, the blood-vessels, and cavernous sinuses, all gradually shrink away, losing their power of physiological engorgement and collapse, so essential to the proper performance of the respiratory functions. This atrophy of all the special tissues of the mucous membrane is accompanied by formation of abnormal connective tissue, though in a minor degree than when the result of hypertrophic disease.

Notwithstanding the shrinkage of the turbinated tissues, Wingrave, on microscopical examination, found imbedded in the interlobular tissues of the glands, in the lymphoid tissues, and sometimes in the stratified epithelium, small, round, refractive cells which he called hyaloid bodies. They varied in size from one-eightieth to one-thirtieth of a millimetre. These bodies increase in numbers as the disease advances. Finally they break up into minute refractive bodies, resembling spores. The question of the nature of these bodies

is still undecided. Some biologists believe them to be the bacteria of atrophic rhinitis.

Klebs-Loeffler bacilli and also staphylococci have been found in large numbers in certain cases of atrophic rhinitis without developing either diphtheria or general suppuration.

Microscopically, multinucleated lymphocytes are found in the atrophic discharges as well as the bacillus foetidus and bacillus of Friedlander. According to Lennox Browne, the crusts consist of mucin, cell-globulin, and serum-albumin, with traces of sulphur and phosphorus.

Fraenkel and Loewenburg have discovered a diplococcus which they claim to have an influence in the etiology of the disease.

Noland Mackenzie maintains that atrophic rhinitis is a sclerosis—a chronic inflammation in which there is an atrophy of specialized tissue, accompanied by mild hypertrophy of connective tissue; that this condition is present in hypertrophic as well as atrophic disease; that the two differ not in kind but in degree, the one being hypertrophic sclerosis, the other atrophic sclerosis.

F. L. Shurly believes the disease to be a pure neurosis of central origin.

Incidental pathological changes occur in a majority of cases. Out of 60 recorded, the pharyngeal and faucial tonsils had entirely disappeared in 56; while in the remaining 4 they were small, thus indicating a direct relationship between the surrounding lymphoid structures and the atrophic disease.

Perforation of the cartilaginous septum is of frequent occurrence. It is, however, generally believed to be, not so much the direct result of the disease itself, as of digital picking. In my own experience, I do not remember a case of perforated septum co-existent with atrophic rhinitis in which I could not trace the origin of perforation to the period of childhood. When it comes under the notice of the physician, the margin of the perforation will usually be found coated with tenacious mucus, overlying a layer of proliferated epithelium. The whole history of these cases of perforation would appear to support Bosworth's theory, that purulent rhinitis in children was the forerunner of the subsequent atrophic disease.

Etiology.—Perhaps there are few subjects in medical science upon which there exist so many differences of opinion as upon the origin of atrophic rhinitis. Fraenkel was the originator of the idea that it was a sequel of hypertrophic rhinitis, and a large number of

observers are still of the same opinion. Seiler says that, while it may be the result of hypertrophy, it may also be atrophy from the start. Drake claims chronic purulent inflammation of the accessory sinuses as the cause. Gottstein holds that defective development of the turbinated bodies may be responsible for the disease. Mayo Collier has thrown out the suggestion that it may yet be discovered that the initial disease was degeneration of the nerve-ganglion and nerve-fibres supplying the parts. E. L. Shurly somewhat favors Collier's idea, for he has long been of the opinion that it was essentially a trophic neurosis of central origin. Bosworth, on the other hand, in his recent issue of 1896, expresses as emphatically as ever the belief that the disease is the result of a previous attack of infantile purulent rhinitis. Gelli also favors this theory.

Personally I have seen a great many cases in young people which could be traced back directly to purulent rhinitis of childhood. In examining these cases there was no history whatever of previous hypertrophic disease; but there was the history of chronic purulent discharge, dating back as far as memory could reach. I believe, too, that it is possible for atrophy to be a sequel to hypertrophy, for I have seen cases in which the relationship appeared to exist; but I do not believe that it is, by any means, the rule.

We rarely meet with hypertrophy of the turbinateds during childhood; as a rule, it is a disease of early adult life; and it is well to remember that the majority of cases of atrophic disease likewise occur in young men and women. It would seem impossible for a slow hypertrophic process to have time for development, and that to be followed by sufficient shrinkage to produce atrophy at the time of life when we are usually called in to treat these cases.

Quite frequently atrophic rhinitis is unilateral, entirely confined to the one nasal cavity, and that one the widest, with a curved septum, the convex surface within the narrow nostril. There may have been no previous purulent disease, and the conclusion seems reasonable that the great width of the fossa had allowed free breathing, while permitting the retention of discharge. The retained secretions would, in time, become purulent. Crust-formation would follow, which eventually, by its repeated presence and pressure, would produce greater shrinkage of tissue.

Symptomatology. The symptoms are characteristic and too well known to require a careful delineation. They consist of dryness of nose and throat, the latter in consequence of the former, accompanied

by formation of crusts within the nasal cavities. These are often difficult to blow out; and, as the disease advances, it becomes impossible, by Nature's effort alone, to thoroughly remove them.

On rhinoscopic examination the fossæ will prove to be enlarged to a greater or less extent, according to the severity of the disease, the enlargement being due to the shrinkage of the middle and inferior turbinated bodies. Greenish-yellow crusts, with a characteristic, offensive odor, will partially fill the passages; and on the removal of these the mucous membrane, although unbroken by ulceration, will present an unwontedly shrunken and pallid appearance.

In this disease the normal serous discharge becomes limited, and finally almost ceases, leaving the air dry and foul by the time it reaches the throat. With diminution of serous fluid there is increased exfoliation of epithelial and pus-cells. These together incrust and clog up the passages. In long-standing cases anosmia is of frequent occurrence, while in many the sense of taste is likewise impaired.

Dryness of throat, or pharyngitis sicca, is always a result in advanced cases; and, as collateral events, the faucial and pharyngeal tonsils usually become atrophic; the contiguous sinuses not infrequently become involved, and the Eustachian tubes may also be affected.

While the offensive factor peculiar to atrophic rhinitis is usually believed to arise from putrefaction of the retained secretions, Wingrave has advanced a new and somewhat plausible theory. He says that, as the mucous membrane is a transformed epidermal structure, having with its glands a common origin with the skin, so in this disease we have a structural reversion, in the stratification of the surface epithelium, to the primitive type; and in the glands there is established a perverted function, the mucous membrane being converted into cutaneous structure, with a corresponding change in secretion. Following out this line of argument, he speaks of the various odors produced by different portions of the skin, such as the feet, the axillæ, the prepuce, etc., and claims that the odor of atrophic rhinitis has a direct kinship with these.

Diagnosis.—Except in its earliest stage, a careful and thorough examination should, with little difficulty, exclude every other disease. There is one remarkable fact, that, after the crusts have been carefully and thoroughly removed, no matter how attenuated the turbinated tissues may have become, ulceration will always be an absent quantity. Of course, where septal perforation exists, there may be ulcera-

tion around its margin; but the perforation dates back to an earlier date than the atrophic disease. Syphilis, on the other hand, is often the cause of extensive ulceration of the bone as well as soft tissues; but the odor of atrophic rhinitis, while disgusting enough, is still distinct from that of syphilitic necrosis.

Prognosis.—Without treatment, prognosis is bad. With treatment, relief can be obtained, and the condition very much improved, and in a few cases cured. But this can only be accomplished by careful and thorough treatment, carried out for years in many cases.

Fraenkel, of Berlin, says, referring to atrophic rhinitis: "A cured case of ozena is unknown to me." Bosworth, in his last edition, says: "In the early stages of the disease, before the foetid symptoms set in, I have seen cases recover. In the advanced stages characterized by fetor, and in which the turbinated bones have almost entirely disappeared, I have not seen a case cured, if by cure is meant a condition secured in which there remains no necessity for any measure of local treatment." Sajous says: "Atrophic rhinitis is, perhaps, the most unsatisfactory of the nasal affections to treat successfully."

All, however, agree that much can be done to ameliorate the symptoms and make life comfortable.

Treatment.—The initial step is always to thoroughly cleanse the nasal and naso-pharyngeal cavities, removing completely all incrustations wherever located. This is best accomplished by the use of aqueous alkaline sprays, such as Dobell's solution, to the anterior nares; and the use of the post-nasal spray syringe, by which water at the temperature of 100° F. can be thrown forcibly through the nostrils from behind. For the latter purpose a Davidson syringe with a curved spray-tube attached is an admirable instrument. The tube being passed up behind the palate and the patient's head tipped well forward over a receiving-bowl, a constant stream of a pint or more may be readily thrown through. This not only loosens the concretions within the nasal passages, but also those behind the palate; and, even if it does not bring them all away, it materially softens them and facilitates their removal. Other instruments (Figs. 50 and 50a) act upon the same principle, although less effectively.

The method of using the nasal douche, and instructing the patient to pass 1 or 2 quarts of hot, medicated fluid daily through the nose, up one nostril and down the other, which is often recommended, only accomplishes part of the object in view. It floods the nasal passages, but not the naso-pharynx; and in this disease it is as im-

portant to cleanse the one as the other. If the nose during the douching is elevated enough to allow the fluid to pass beyond the soft palate, there is serious risk of flooding the Eustachian tubes, an accident involving much danger to the inner ear. The use of the post-nasal syringe, carefully adjusted well up behind the soft palate, with the head tipped forward, is devoid of this danger, while, as

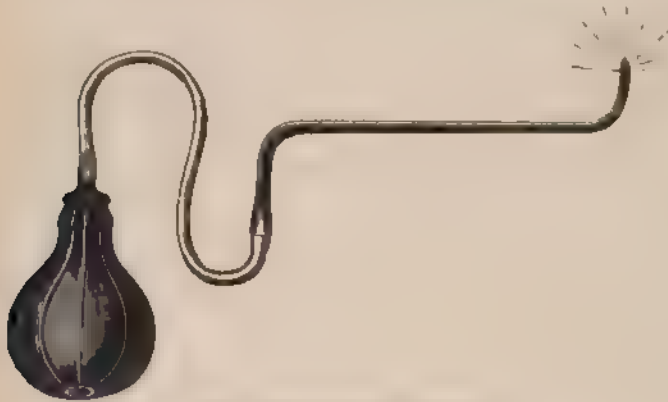


Fig. 50. Post nasal syringe.

already stated, it cleanses the combined nasal and post-nasal region, and consequently is preferable to the former method. It also simplifies the treatment, as patients can be taught to practice the one as readily as the other.

The anterior nasal spray from a good atomizer is a good adjunct to the post-nasal treatment. Still, when the disease is severe, the two



Fig 50a Post nasal syringe.

together will not effectually cleanse the parts from crusts. To complete the removal, the nasal cotton-carrier by the anterior nares, and the curved cotton-carrier by the naso-pharynx, will both be required. In first treatments especially this should be done in a painstaking and thorough manner, and always by the aid of anterior and posterior rhinoscopy with a good reflected light.

This step having been accomplished, it is generally conceded that the next one is to stimulate the atrophic membrane to a better performance of its natural function of secretion. To this end Gottstein recommends plugging the nostrils for twenty-four hours with cotton tampons. When they are removed a flow of mucus follows the stimulation. When the flow subsides, the cavities are cleansed again and fresh tampons inserted. The whole procedure is repeated as frequently and for as long a period as required.

Woakes uses Gottstein's plugs for the purpose of applying powders of a stimulating character to the diseased membrane. Sajous advises the use of the galvanocautery passed rapidly over the surfaces, and Lennox Browne favors the same plan with subsequent insufflation of iodol or iodoform. Shurly and Bryson Delevan recommend the galvanic current, the positive electrode being placed on the nape of the neck, and the negative, wrapped in absorbent cotton, to the interior of the nose. Delevan uses from 4 to 7 milliamperes with a duration of from seven to fifteen minutes at each sitting, until serous discharge occurs.

Other methods of treatment are the use of stimulating sprays after the cleansing, such as solutions of thymol, creasote, argent nitrate, etc., of varying strengths; but these are of doubtful value.

Another method of treatment originated by Braun, of Trieste, several years ago, and which from its enthusiastic acceptance by his countrymen, might be called the Italian method, is that of vibratory massage of the mucous membrane. Outside of Italy either in Europe or America it has not been received with any marked favor; but I am glad to see that Bishop, in his recent work, speaks favorably of massage. Personally, from my own experience, I indorse his views, though each of us has modified his practice to suit his own individual cases. As recommended by Braun, an olive-pointed probe is passed within the nostril. It is held between thumb and finger like a pen, and the vibrations are produced by the clonic rhythmical movements of the hand and forearm of the operator as he presses the olive point against the mucous membrane. By practice these contractions are said to number about four hundred per minute.

The mucous membrane of each nasal fossa covers between thirty and forty square centimetres, and the space operated on will be about one square centimetre at a time. Braun says he makes the time of each vibratory application about five minutes to each nostril. He also precedes the treatment by the application of cocaine.

To relieve the fatigue of the operator, as well as to make the vibrations more rapid and uniform, electromotor instruments have been made, from which their originators claim to have produced even better results than by manual vibration.

Bishop's modification is by using an ordinary cotton-holder, or probe. He wraps the end with a loose wad of cotton, and, passing it into the nostril, by hand-vibration combines the double purpose of cleansing and massage.

My own method, and from which I have seen excellent results, is somewhat different. I have practiced it now for several years. After thoroughly cleansing the fossa, I wrap a pledget of absorbent cotton firmly and closely round the end of the holder, in the form of an olive-shaped tip. This is dipped in alcohol and used by hand vibration according to Braun's method. After each vibratory movement the cotton is slipped off; and with a few twirls between thumb and finger another one applied. One advantage of this method is that the firm cotton tip can be made of any shape and size to suit the various crevices within the nasal cavity. I may also add that, for massage so applied, I never find it necessary to use cocaine.

Sometimes after removing the incrustations as thoroughly as possible, even with the after-treatment of massage, a thick layer of tenacious epithelium, projecting from the lower border of the middle or inferior turbinateds, will still defy all efforts at cleansing. To remove this the application of a 10-per-cent. solution of nitrate of silver to the spot will sometimes be sufficient; but I have usually obtained the best results by singeing the proliferation with the galvanocautery. This should never be carried to the extent of destruction of the whole epithelial coating. As a result, the pale, bloodless, stringy membrane would give place to a pinkish one of more healthy color.

One peculiarity of formation I have observed in several instances. In each case it was confined to the side affected by the more marked atrophy. This was the attachment, by a cicatricial band, of part of the inferior border of the middle turbinated, either to the upper part of the lower one or to the external wall of the middle meatus. These special instances seemed to owe their origin to a previous hypertrophic condition. In treating them, after applying cocaine, I have separated the attachment by the galvanocautery with advantage to the progress of the case. One thing more I may add: that for years now, after cleansing and massage, instead of completing each treatment by the use of some stimulating spray, I have obtained the

most satisfactory results to my patients by simply finishing with a spray of one of the hydrocarbons. As said before, these bland, inodorous, aseptic preparations are soothing and grateful to the patient, and act as protectives to the whole lining of the mucosa.

For home-treatment the patients are directed to use the post-nasal syringe first, at least once a day; and follow this up with sprays of albolene or glycolin at intervals of several hours, until they return to the office again for more thorough treatment.

The solutions used in the post-nasal syringe may consist of 1 per cent. of any of the following, in water at a temperature of 100 degrees:—

Muriate of ammonia.

Chlorate of potassa.

Chloride of sodium.

Boric acid.

Resorcin.

Or 2 per cent. of

Biborate of soda or

Bicarbonate of soda.

Or a 5-per-cent. solution of peroxide of hydrogen.

These answer very well for a time, until the patients have become familiar with the post-nasal method of treatment. I have subsequently obtained better results by having them use simple clear water at as high a temperature as they could comfortably bear.

CHAPTER IX.

CEDEMATOUS RHINITIS.

THE earliest mention I can find of this disease is in the report of the American Laryngological Association for 1893. In his paper J. C. Mulhall describes it as a serous infiltration of the middle or inferior turbinateds. It is remittent in character and may be unilateral or bilateral. It may also be migratory and either acute or chronic. When punctured, serum slowly exudes. He says cocaine has little or no influence over it. It may be associated with bronchial asthma, but only in a minority of cases. It is considered to be a neurotic affection, yet distinct from the neurotic diseases which are caused by extrinsic excitants.

In treatment Mulhall says that sprays are contra-indicated, and that the best results are obtained by scarification. If nasal deformities are present they should be removed. In treatment the alimentary canal and the general system should be carefully attended to.

This is a rare disease, and I have only seen one well-marked case. The patient is a young man, aged 26 years, of sedentary occupation. A number of years ago I removed a large spur for him, and also cleared the naso-pharynx of adenoids, to remove the stenosis from which he was suffering. For a couple of years he was free from any difficulty in nasal respiration. Then the stenosis commenced to recur again, sometimes very suddenly. Previous to the attack the septum and turbinateds would appear perfectly normal, and there would be no difficulty whatever in breathing through either side. Then from cold taken from exposure, or sudden dropping of office-temperature, one nostril, within an hour or so, would become completely blocked. Examination would reveal one fossa quite clear, the other absolutely closed, a pale, serous-looking oedema distending the mucosa of both the septum and inferior turbinated of the affected side, and the parts bathed in muco-serum. On examining the throat, the posterior rhinoscope would reveal the corresponding choana filled by the grav. swollen, inferior turbinated body.

Unlike Mulhall, I found the application of a 4-per-cent. solution of cocaine, passed slowly through the nostril upon a cotton-carrier and applied freely to the whole length of the turbinated, would, on each occasion, give speedy relief. The charging of a good-sized pledget would be all that would be required, and in five minutes respiration through the passage would be restored. I found, also, after repeated trials, that the relief obtained would be very much prolonged and in some cases would continue for days, if the cocaine treatment was supplemented, as soon as the passage became clear, by a spray of thymo-menthol of the following strength:

1. R	Thymol	.....	13
	Menthol	.....	1
	Albolene	.....	30
M.			

The preparation appeared to prolong the astringent effect of the cocaine and to stimulate the tissues to more effectual control of the vasomotor vessels.

Quite frequently the oedema, after occurring for two or three successive days on one side, would suddenly cease and appear again in the adjoining cavity in just as severe a form, disappearing for the day, after treatment, to occur again perhaps twenty-four hours later.

In this case there was no hypertrophy whatever, either of septum or turbinateds, and, when the attack passed off, the parts seemed to be in a perfectly normal condition. Sometimes months would pass without any trouble. In every other way the young man was in a strong, healthy condition.

During the fall and winter, however, he has for years had a number of seizures; and the present year the symptoms, particularly on the left side, were particularly severe, threatening to remain throughout the summer months as well. Consequently I decided to make a deep galvanocautery incision along the full length of the lower turbinated on that side. For a day or two there were no signs of hæmorrhage. Then it came on profusely, and plugging with kite-tail tampons had to be resorted to. They were worn nearly a week and then extracted piecemeal for several days longer, the fossa being washed daily by sprays of 2-per-cent. cocaine and $\frac{1}{2}$ per cent. of

1	R	Thymol	.....	gr. ij.
		Menthol	.....	gr. xv
		Albolene	.....	3j.
M				

thymol in glycolin. The tissues seem to be again under control, and for weeks now the œdema has ceased to occur. Whether the advent of the changeable autumnal season will bring it back again remains to be seen.

CHAPTER X

FIBRINOUS RHINITIS.

This is an acute inflammation of the mucous membrane of the nasal passages, attended by a deposit of fibrinous exudation upon its surfaces. It presents the pathological features of false membrane imposed upon the epithelium without involving the deeper tissues.

As most of the cases of membranous rhinitis that have occurred and been examined have been simply an extension of diphtheria deposit upward into the nasal cavities, many observers still believe that it is always of diphtheritic origin and the result of the presence of the Klebs-Loeffler bacillus.

Recent experiences accompanied by careful clinical and pathological examinations have proved, however, that this is not the case. Fibrinous exudate within the nasal passages of non-diphtheritic origin does sometimes occur, and it is of this I now speak.

In 1893 the "Transactions of the Pathological Society of London" contained an exhaustive article upon the subject. In it Abbott, while leaning toward the idea that all cases were of a mildly-diphtheritic character, states positively that: "It cannot be too often insisted upon that the true nature of all membranous deposits upon the mucous membrane of the air-passages (referring to the nose) can only be definitely revealed by bacteriological research": a tacit admission that non-diphtheritic membrane might exist.

In 1894 Brun Murdoch, at the laryngological section of the British Medical Association, reported a case of recurrent membranous rhinitis which occurred in a female aged 33 years. During a little more than a year she suffered from six different attacks without any indications of true diphtheria. A number of bacteriological examinations of the false membrane were made; but all failed to show any Klebs-Loeffler bacilli, although a number of micrococci of no special moment were present.

The symptoms were at first those of slight head cold, rapidly getting worse and continuing for several days, with complete occlusion of nostrils. About the fifth day white membrane would appear in the anterior nares. This would scale off, leaving the parts some-

what raw and the nose swollen. There was no rise of temperature, but severe sneezing. The whole attack would last about a fortnight.

Hot bathing, iodoform, menthol in fluid vaselin, cocaine, etc., only slightly relieved the symptoms. At one time galvanocautery-singeing produced partial relief.

In the same year Schiffer read before the Belgian Society of Otology and Laryngology a paper on the "Pathogenesis of Non-infectious Croup of the Nasal Mucous Membrane," with the history of a case. The membrane was confined to the nasal cavities. The general symptoms were slight, save for the nasal membranous obstruction. Microscopical examination proved the absence of the Klebs-Loeffler bacillus. There was no sign of the disease being infectious.

In 1898 Middlemas Hunt, in a paper on "The Relation of Fibrinous Rhinitis in Diphtheria," reported four cases of fibrinous rhinitis. In two of these there were no indications of Klebs-Loeffler bacilli. In the other two, although none was discovered at the time, diphtheria followed in the one patient two weeks later, and in the family of the other after a similar interval. In concluding his article Hunt uses these words: "I am afraid there are no clinical characters on which we can rely in distinguishing the two diseases, and our one method is to turn for help to the skilled bacteriologist."

Richard Lake, of still later date, gives the history of a case of chronic pseudomembranous rhinitis, occurring on the right side, in a man aged 54. He was a hay-fever subject. Treatment had only a temporary effect; and when he returned for examination, ten months later, the membranous disease had increased in severity. Microscopical examination revealed the staphylococcus pyogenes aureus in abundance, but no Klebs-Loeffler bacilli.

In March, 1898, I reported an idiopathic case of membranous rhinitis to the Toronto Medical Society. It occurred in a young lady, aged 17 years, an abstract account of which appeared in the *Journal of Laryngology*, May, 1899. This was unilateral, affecting and closing, for the time, the left nasal fossa. The membrane was whitish-yellow and inodorous throughout. It extended to the posterior nares, but not into the naso-pharynx. The treatment consisted of applications of cocaine, solutions of nitrate of silver, and albolene. There was no fever. Microscopical examination discovered no Klebs-Loeffler bacilli, but a large and pure culture of staphylococci was made from the membrane. The cure was completed in about three weeks of regular treatment.

With reference to the statement that a similar false membrane is always produced by the application of the galvanocautery to the mucous surface, it must be remembered that the protective covering is only formed upon the spots cauterized, whereas, in fibrinous rhinitis, the whole mucous lining may be affected. Sometimes, however, the effect of cauterization is not so limited, and the burning of a single spot within the nasal cavity may induce the formation of false membrane throughout the fossa. Although this fact is well known, the literature upon the subject is so meagre that the report of a case may not be without interest.

In September, 1895, a young lady, aged 25, a farmer's daughter, came to me for treatment for hay fever. On examination there was nothing unusual in the appearance except that the inferior turbinateds were very much enlarged. Otherwise they had the ordinary pale hue usually present when hay fever exists. Under cocaine, I burned both the inferior bodies through the centre from behind forward. Twenty hours later, on her return for treatment, both nares were stenosed and the whole lining mucosa of each passage, so far as it could be seen, was covered with false membrane. All that I could do for her relief was the application of cocaine followed by vaselin. The membrane became thicker, but retained its clear, white color without odor. In two days it commenced to loosen, and I removed it gently in large flakes with the forceps. The recovery was rapid and the relief of the hay fever complete.

Two years later, in September, 1897, she returned again for treatment for hay fever. She said she had none the previous year. On examination, the inferior turbinateds were all right, but the middle ones were enlarged and pressing on each side against the septum. These I also cauterized, though much less extensively than the inferior ones on the former occasion. I also took the precaution to insert a small pledget of cotton on each side between the septum and the middle body.

When she returned to the office on the following day the old condition was repeated. The whole mucous membrane on each side was coated with white, fibrinous membrane, and the treatment and history was but a repetition of what occurred two years before. On both occasions it was undoubtedly traumatic pseudomembranous rhinitis, but it was unaccompanied by fever. I regret that no bacteriological examination was made on either occasion. Other writers have reported similar cases resulting from cautery-work.

In closing this chapter I may, perhaps, venture to draw the following conclusions:—

1. That non-diphtheritic pseudomembranous rhinitis does sometimes occur, and, though a very rare disease, it is probably as frequent as *primary* nasal diphtheria.

2. That on clinical grounds alone it is possible, in a majority of cases, to distinguish it from genuine diphtheritic disease.

3. That, owing to a possible mistake in diagnosis, isolation in all cases should be imperative, until a reliable bacteriological examination can be made.

Since writing the above an able article has appeared upon "Fibrinous Rhinitis" from the pen of Gibb Wishart, in the September issue of the *Laryngoscope*. In it he gives the history of seven cases, two of which were benign, while five exhibited the Klebs-Loeffler bacillus. He also sums up all the cases of which he can find a record, totalling 98: 69 with Klebs-Loeffler bacilli and 29 without.

In conclusion, while he recognizes that many observers consider fibrinous rhinitis a distinct disease, he believes that the accumulated evidence proves the following points:—

1. Fibrinous rhinitis and diphtheria are not distinct diseases.
2. All cases of fibrinous rhinitis need the same precautions as to isolation that diphtheria requires.

CHAPTER XI

DEFORMITIES OF THE NASAL SEPTUM.

In adult life septal deformities are the most frequent cause, not only of catarrhal affections of the nasal passages, but also of defective and unequal nasal breathing. What seems strange is that these deviations from the normal in symmetry should be confined so largely to the civilized races of men. This is borne out by examinations of the skulls of civilized and aboriginal races. In the museum of the Royal College of Surgeons, London, out of 2152 skulls, it is reported, on reliable authority, that over 70 per cent have irregularities of the septum. On the other hand, Sir Morel Mackenzie and Zuckerkandl, after carefully examining a large number of the skulls of the aborigines of America, Africa, and Australia, found only 20 per cent. of the nasal cavities presenting osseous abnormalities. Allen examined the skulls of 93 negroes, and found deflections and irregularities in only 21 per cent.

Recently, in Toronto, at the Archæological Museum of Ontario, which contains the most exhaustive collection in Canada, I examined 220 Indian skulls, by far the largest number of them being Hurons and Iroquois. One hundred and eight were all in which the septa were sufficiently well marked to base a judgment upon. The result, however, was different to that of the observers already mentioned. Of the 108, 54 had deviated septa and 54 had straight ones, or 50 per cent. of each. Of the number 4 were Flatheads from British Columbia; 2 had deviated septa, 2 had straight. Two others were Mound-builders from Arkansas, of pre-Columbian history; 1 had deviated septum and 1 straight.

I might add, as a curiosity, that, among a number of skulls of Egyptian mummies, only one was sufficiently unwrapped to admit of examination. In this the septum was straight; but the left inferior turbinated was wedged against the posterior end of the vomer. This archæological specimen, three thousand years old, was an extreme exception to the general rule; for almost invariably when the septum was straight and centrally situated there was nothing abnormal in the condition of the turbinated bones.

To turn to the conditions in actual life, Collier reports that, out of 1050 adult patients examined indiscriminately at the Northwest-London Hospital, only 110, or about 10 per cent, had normal noses, a large proportion being affected by septal deviations. In children up to the age of eight or ten years the septa as well as turbinateds were generally normal or almost so—any obstruction at that early age being usually caused by lesions other than bony. Figs. 51 and 51a, taken from a frozen section of a child aged 5 years, is a striking exception to this rule, the deviation and the spur to the left being strongly marked.

In the normal nose the septum is simply a bony and cartilaginous wall, dividing it equally into two symmetrical fossæ. In all the lower animals, in young children, and in the lower untutored races of men, this is still, in large measure, the case. But, as you approach adult life among the civilized races, septal deformities appear in large numbers, until, as reported by so many observers, the percentage of these inequalities becomes exceedingly great.

A proper classification of these deviations would be difficult to make. Quite frequently the septum is not thickened, but the cartilaginous portion makes a full convex curve into one or other nasal fossa. In other cases with the curve there will also be a marked projection or spur on the convex side. Again, spurs or conical projections may appear on one or both sides of the lower end of the triangular cartilage without any curvature of the upper septal wall. In other instances a longitudinal ridge will appear in one fossa, extending backward along the base of the cartilage and involving also the lower part of the vomer, while the upper part of the septum retains its integral position. Some septa have a double curvature, or concavo-convex form, from before backward; and still others have a sharp longitudinal notch on one side, like the niche of an open book, with a projecting perpendicular ridge on the opposite side of the septum. Synechiæ, or bridges connecting the bony septum with the middle or lower turbinated of the same side, are not infrequent. There is often, too, a combination of several irregularities in the one nose; while last, but not least, almost any deformity on the one side of the septum is attended by some deviation from the normal on the other.

Etiology.—This is a many-sided question, and many diverse views are held upon it. Some authorities, Bosworth among the number, believe that the large majority of cases owe their origin to trau-

matism. This author says: "The point on which I lay special emphasis is that the deformity is primarily the result of traumatism, and, secondarily, of a slow inflammatory process which results therefrom." Zuckerkandl has pointed out that in many instances a narrow strip of cartilage lies between the perpendicular plate of the ethmoid and the vomer, due to defective ossification, and in cases of septal injury this might readily give rise to ridges found in this region.

Roe draws attention to the fact that in early life the vomer is divided into two laminae, separated from each other by a thin layer of cartilage, which is prolonged forward to form the cartilaginous portion of the septum. Ossification begins in the second week of infantile life in each plate, but is not complete until puberty. About the third year union commences between the plates from behind forward. In this case, too, it is not complete until adult life, and sometimes never. Hence many of the deformities may arise from overgrowth of the anterior or free portions of the plates. This would also account for the rarity with which we meet this deformity of the posterior end.

Trendelenburg believes that many cases arise from the upward pressure of a highly-arched palate. Other writers believe that the deformity is produced by overgrowth of the septum in a confined space. Jarvis affirms that many cases owe their origin to heredity, and reports four cases occurring in one family in support of his view. It is easy to believe heredity to be an important factor in producing intranasal deformity, just as it is a potent element in producing types of feature and of form. As an instance, I might mention that one of my patients, a boy of 10 years, has developing a curvature of the septum to the left. His father had a curvature to the left, also, large enough to produce almost complete stenosis on that side. On further inquiry, I was informed that the grandfather had been a great snuff-taker, but that he always took it through the one nostril. The conclusion is obvious: the grandfather had transmitted the tendency to the son and grandson.

With all this multiplicity of views as to causation, it is possible that Mayo Collier's researches, founded upon Zeim's experiments on young animals, may have struck the key-note. He claims that these deformities are largely due to the effects of atmospheric pressure, badly equalized within the nasal cavities. In his investigations Zeim would completely block one nostril of a young animal with some soft substance, effectually stopping the respiration on that side. This would be left in for a long time. The result in every instance,



Fig. 51. Frozen section of the head of a child aged 5 years. 1, Section through back part of eye. 2, Posterior ethmoid cells. 3, Superior turbinated bone. 4, Middle turbinated bone. 5, Antrum of Highmore. 6, Septum curved to the left. 7, Inferior turbinated. 8, Superior meatus. 9, Middle meatus. 10, Inferior meatus. (From Primrose's Anatomical Museum, University of Toronto.)



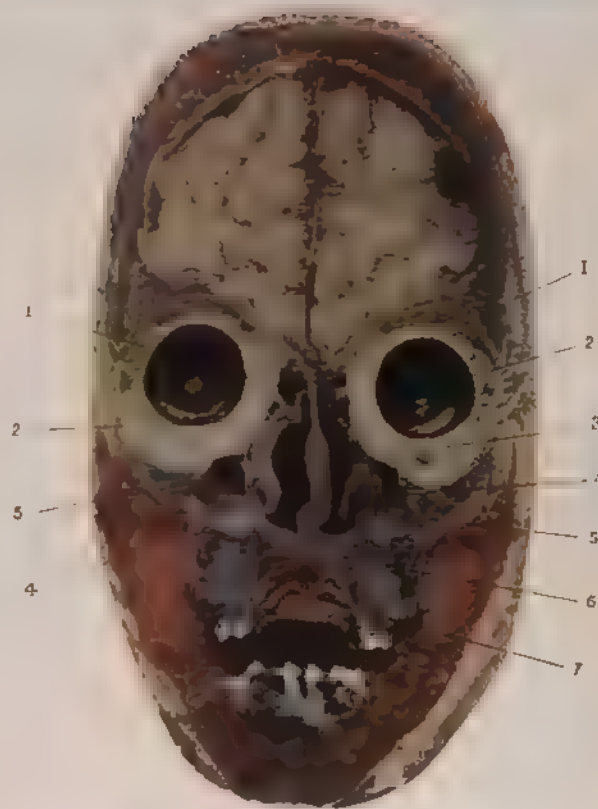


Fig. 51a Frozen section of same child, taken two centimetres anterior to Fig. 51. 1, Anterior ethmoid cells 2, Middle turbinated bone, 3, Septum curved to the left 4, Inferior turbinated bone 5, Antrum of Highmore 6, Hard palate 7, Vault of mouth (From Primrose's Anatomical Museum University of Toronto)



and he tried it in a great many, was the arrest of the development on that side, with deflection of the septum, the palate, the intermaxillary and frontal bones, all toward the blocked cavity. At the same time, the unobstructed cavity would be larger than natural and more fully developed. The reason is the rarefaction of the air in the closed nostril during inspiration, caused by the rush of air through the open one, with the consequent atmospheric pressure upon all sides of the closed cavity.

Collier applies the same principle in unilateral nasal obstruction occurring in men as Zenn does in his experiments on animals. Of course, before the effects of rarefaction could occur, there must arise from some cause partial stenosis of one nasal fossa. Then, in due time, though it might take years to develop, the results indicated would be likely to follow. In children, and many of the cases have their origin in early life, the obstruction might arise from neglected colds, particularly when the child was allowed to lie too consecutively on one side.

Symptomatology.—The principal symptom is that of more or less unilateral nasal stenosis. The secondary effect is a changed condition of the mucous membrane, which usually culminates in a chronic nasal catarrh. It is often the catarrhal condition, with its attendant throat-dropping, which chiefly attracts the patient's attention; and he will frequently present himself for treatment without any personal knowledge of the existence of the stenosis, owing to its very gradual development.

Septal deformity will frequently give rise to epistaxis. The projecting surfaces are exposed to the dust with which the air of respiration is often loaded; and the contact of these particles on the walls of the capillaries produce minute lacerations and consequent hemorrhage. And it must be remembered that it is from the septum that the nose usually bleeds.

The voice also becomes affected, particularly when the deformity is very marked; but this symptom is common to nasal obstruction from any cause.

Dullness of hearing is not an infrequent symptom, arising from the extension of the catarrhal condition to the Eustachian tube. In these cases straightening the septum may be expected to be followed by improvement in hearing.

Diagnosis.—This can only be made positive by direct examination, for which reflected light, head-mirror, nasal speculum, and post-

rhinal mirror may all be required. A practical knowledge of the parts should then remove all doubt. Sometimes a mistake may be made by the anterior end of the middle turbinated being on a line with the septum. At this spot a group of projecting glands may hide the point of separation. (reswell Baker calls this spot "tuberculum septi.") Careful examination, however, will easily remove the doubt. Nasal polypus and fibroma of the septum are both movable, while the septum is not. The former, too, is lighter in color and softer, while the latter is darker and subject to hæmorrhage on the slightest touch.

Prognosis.—Left to itself, no septal deviation or deformity will improve, and the symptoms produced by it are likely to remain unrelieved.

In cases where the symptoms are mostly catarrhal, with partial stenosis on the affected side, removal of the obstruction should be attended by good results. In ear disease, too, arising from this cause, benefit may be expected from similar treatment. Pharyngeal catarrh is also greatly benefited by restoration of normal breathing. In hay fever and asthma, these diseases being so frequently reflex in origin, improvement will often follow operation, though the prognosis should always be guarded.

Treatment.—The removal of the stenosis produced by the deformity is the most essential feature of treatment, and the methods to accomplish this vary materially, according to the character of the lesion.

Although fractures and displacements of the septum are of frequent occurrence, they are unfortunately rarely presented for treatment until after irregular union and healing has occurred, and the after-effects noticed. When, however, the fracture is fresh, the fragments can be pressed back into position, and retained in place by suitable rubber or cork splints, cut to the required shape and placed within the nasal passages. It has been said that splints are not required in these cases, as there is no muscular action to displace the structures, once placed in position. This is a mistaken conclusion. After fracture there is always swelling or œdema, and this itself may separate the newly-adjusted parts. Blowing, to free the nose from discharges, may also interfere with the proper union. On the other hand, a carefully-adjusted splint inserted on the side of depression will support the fragments without producing distress; and a week or ten days' immobility will suffice to effect the desired union. Thick

rubber splints of medium softness, carefully adjusted to suit the size and condition of the parts, are also in many cases of curvature of the septum exceedingly useful. If worn for a number of weeks, the constant support they effect will restore the passage to an almost normal condition. Their usefulness is highly appreciated by Lake and other writers.

Consolidated deformities of the septum are treated in various ways by different authors. Where projecting spurs and ridges produce obstruction, all agree that the exostoses and hyperchondria should be removed. Many believe, with Bosworth, that they should be excised by means of saws. The intention is to leave a smooth, plane surface over which mucous membrane will quickly form with little or no cicatrix.

When the distortion presents itself in the form of an hypertrophied ridge or spur upon the cartilaginous portion of the septum, this can frequently be removed by means of a sharp, narrow-bladed knife, leaving, as a result, a smooth surface and an open passage. A recoating of new mucous membrane quickly follows. The accompanying microscopical section was taken from a spur removed in this way from a gentleman, aged 58, who had been suffering from nasal obstruction for thirty years. Calcification had commenced in the hypertrophied cartilage (Fig. 52).

Other operators advocate the use of burrs operated by a dental engine or electromotor. Holbrook Curtiss has invented a series of small trephines adapted for the removal of this septal outgrowth. These are ingenious, but unless very skillfully used they may fail to leave the perfectly smooth surface which is so desirable and which can be secured by the use of the saw. The latter instrument is usually operated by hand, but can also be attached to an electromotor machine.

To save the mucous membrane, Fletcher Ingals makes an incision along the lower margin of the spur, dissects up the mucosa, and, retracting it to free operation, excises the projecting cartilage. The mucous membrane is then drawn down and sutured to its former attachment. By this means the original mucosa is retained in its entirety. Kyle follows a similar plan in curvature of the septum.

Loeb advocates the use of sharp, highly-tempered curettes, particularly in cases where saws cannot be used.

Cheval, Ballinger, Casselberry, and other recent writers have used electrolysis with good results in removing cartilaginous spurs.

The latter found electromotor force of 11 to 14 volts necessary, with a current-strength of from 15 to 40 milliampères, according to the amount of resistance found in the spur operated upon. The time for each sitting was from five to eight minutes, to be repeated two or three times at intervals of several days.

In some cases after removing a spur or ridge, at the base of a

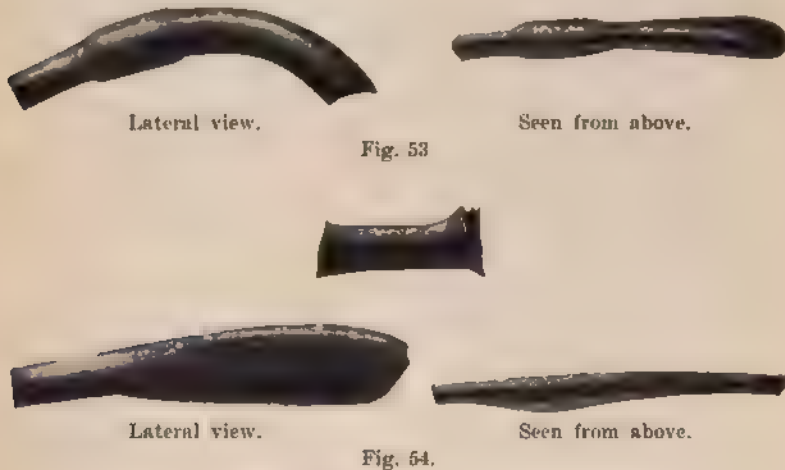


Fig. 52.—Section of cartilaginous spur from the nasal septum (25 diameters) a, Stratified ciliated epithelium. b, Stratified squamous epithelium c, Glands d, Connective tissue layer e, Cartilaginous spur, the lower, shaded portion undergoing calcification. (Author's specimen by Bensley.)

convex curvature, I have corrected the curve above by the use of a silver tube. If the instrument is worn for a few weeks or months, the cartilage, being pressed by it into the normal position, will remain so with but little subsequent deflection, the adjustment being

rendered easy by the cutting away of the spur or ridge base. The advantage of silver tubes lies in their lightness, aseptic character, smooth surface inside and out, and the fact that a silversmith can form one to suit each special case. The open tube enables the patient to breathe through it. A small bulge placed on the outer wall will secure its retention, and the patient can soon learn to remove it daily for cleansing purposes and return it to its position (Figs. 53 and 54).

Tubes of this kind are also useful in cases of severe traumatism, in which either of the anterior nasal passages has been destroyed. In one case which I reported to the laryngological section of the American Medical Association at San Francisco several years ago, the



Silver tubes for septal deformity.

mucous membrane of the cartilaginous portion of the left nasal passage had been entirely destroyed, the anterior ends of the middle and inferior turbinates being firmly united to the septum. I cut a new opening through the fibrous cicatricial tissue and had the tube (Fig. 53) made to be passed into it. The front end was half a centimetre from the anterior naris and invisible. The arch being upward prevented mucus from gravitating into the tube, and it enabled the patient to breathe freely through it. The bulge kept it in position. The wearer takes it out every morning as a matter of toilet, and at once returns it. He has worn it now for five years. Since the operation he has resumed his position as leading tenor in a large church.

which he had been compelled previously to resign, on account of post-nasal catarrh caused by the unilateral stenosis. I expect in time the artificial opening will remain permanent, without the use of the instrument.

In a somewhat similar case, in which traumatic adhesions had formed from the floor to the middle meatus, Myles succeeded in a different way. He trephined along the floor of the nose, and then inserted a rubber tube. This was retained until a new passage had formed. The subsequent operation was the removal of the cicatricial tissues between the superior meatus and the new opening.

When the enlargement would indicate increased length or height of septum, Arthur Watson advocates removing an elliptical or wedge-shaped portion, as the case might require, cutting through the septum, but leaving the mucous membrane on the opposite side entire. Cutting forceps could be used if required. The parts are then pressed into position and held by pins, the ends of the pins being padded to prevent ulceration. They may be left in position for three weeks, when union will be accomplished with cure of the deformity. The spokeshave is also used for the removal of projecting nodules and spurs upon the septum, giving, in many instances, a satisfactory result.

As a rule, I think the most widely useful of all is the saw operation. It will fulfill the requirements of the majority of cases. In the first place, a 2- or 4-per-cent. solution of cocaine should be thrown into the nostril by an atomizer. Then a stronger solution, of 10 or 15 per cent. should be applied by a curved cotton-holder to the septum. This may be repeated two or three times. In five to eight minutes the parts are ready for operation. Two saws are required: one with teeth on the upper edge, the other with teeth on the lower. It is always better also to have the handle of the saw at an angle of forty-five degrees to the central line of the shaft. The lower blade is inserted first and the cutting is always done parallel to the axis of the septum. Then the cut downward with the upper saw is made to meet exactly with the inferior incision. To perform the operation requires a good speculum and a good reflected light. The wording of the operation is simple, but, to do it successfully, care and patience are required. When the exostosis is large and hard, the operation may be tedious, necessitating several stoppages before completion, in order to arrest or remove the blood. There is also danger from faintness, due to the action of the cocaine combined with the

shock of the operation. There is likewise danger of cutting through the septum, and, although this was the approved method of treatment at one time for the relief of one-sided stenosis, it is something which the careful surgeon wishes to avoid now. With judicious management, it is an accident of exceedingly rare occurrence.

Little after-treatment is necessary. If hæmorrhage arising from the operation does not at once subside, it is better to pack the bleeding-spot with cotton tampons. These may be left in for one, two, or even three days without producing any evil effect. They may be renewed entirely or in part at any time, as the tendency to bleeding may direct. One of the main objects after operation is to prevent the anterior part of the cut surface from becoming dry, as any hard crust forming upon it would retard the process of healing. To avoid this the patient should be directed to apply vaselin to the septum several times a day. This should be done particularly before retiring for the night.

In the majority of cases a few weeks will suffice to recoat the raw surface with mucous membrane. It gradually forms from the border-line, usually covering the wound without leaving any cicatrix to mark the site of the operation.

Occasionally unpleasant sequels follow operations upon the nasal septum: such as severe hæmorrhage, which may recur at intervals for several days before it entirely ceases; formation of synechiæ between the septum and the inferior turbinate; and the production of excessive granulations. Careful treatment will avoid or at least overcome all these difficulties. Very rarely even a septal abscess has been the result of septal operation. Lederman recently reported a case of this kind. It occurred in a young woman aged 22. Ordinary antiseptic precautions were taken. The first saw operation upon an extensive ecchondrosis gave some relief and healed well in two weeks. A second operation to complete the removal of a remaining exostosis was then done. In four days an abscess of the septum commenced to form and had to be lanced several times before it entirely healed.

In dealing with these cases it is not the operative, but the post-operative, treatment that I have usually found the most troublesome. By saw or knife, drill or scissors, or curette, single or combined, the projecting spur or ridge might be removed; synechiæ connecting the turbinate with the septum could be excised; or a partial turbinectomy when necessary might be performed: but to procure smooth equal

support for the incised tissues during the process of healing has been a much harder matter.

I think that rubber splints, made as Lake advises, from thick rubber sheeting, do better work than anything else we have at our command for many of these cases. Their surfaces are smooth, compressible, and elastic; they can be readily cut to the required shape, and they can be obtained of any thickness we desire.

After cocaineizing the parts and coating the plug with vaselin it can readily be placed in position. Once in, it will not only retain its place, but by elastic pressure give a smooth and even support to the raw surface to which it is applied, as well as prevent that profuse granulation which otherwise would sometimes occur. At the same time it does not retard the gradual extension of the new mucous membrane, while it molds the tissues into a smooth and regular form.

The stiff pliable rubber, although not so hard on the surface, nor possessing the polish of the vulcanite, is probably just as impervious to bacterial invasion. Sometimes, however, after prolonged use it will acquire a peculiar, unpleasant odor, in part arising from the rubber itself. In these cases new splints or tampons should be substituted for the old ones.

The length of time during which the splint will require to be worn will depend upon the particular condition of each case. On placing it in position it may usually be allowed to remain in from two or three days to a week without removal. The chink above the splint can be washed out each day with a weak spray of cocaine, followed by one of albolene; so that there is no danger of retention of septic secretions. Quite frequently, too, when once removed, there will be no necessity for a replacement of the tampon.

CHAPTER XII.

DISTORTION OF THE COLUMNAR CARTILAGE.

BOSWORTH was the first to draw attention to the dislocation of this body. In both the cases of which he gave a detailed report the displacement was extreme, seriously interfering with respiration through the corresponding naris; and in each, in order to give adequate relief, complete removal of the cartilage became necessary. A small incision was made along the axis of the cartilage and the cartilage itself removed through the opening. Then the redundant portion of the mucous membrane was excised and the edges united with fine sutures. The result was satisfactory in each case.

Although extreme cases are rare, displacement of the columnar cartilage, to a more or less degree, is not by any means infrequent.

The columnar cartilage is a little column of cartilage placed directly anterior and inferior to the triangular cartilage of the septum. It is loosely attached to it by connective tissue in the centre and mucous membrane on the two sides. It is very movable, covered by integument, and forms the septal division of the two anterior nares.

The anterior end, placed just beneath the tip of the nose, is almost invariably in position. It is the lower, or posterior, end that so frequently becomes distorted; and, being displaced to one side, may have the effect of almost completely closing that nostril.

The cause of the distortion is somewhat obscure; as displacement of the septum in infancy is almost unknown, displacement of the cartilage at that early age would be even more rare. The probability is that the distortion is in every instance acquired. It may owe its origin to picking the opposite nostril or placing the finger in the wider cavity, to which some children are addicted. From personal observation I believe, too, that it sometimes arises from the habit, acquired during childhood and practiced on through life, of invariably twisting the nose over to one side when using the pocket-handkerchief.

One of my earliest cases was a gentleman of 40 years. He had

a good deal of septal deformity, but the columnar cartilage was the worst of all. It was doubled on itself and almost filled the right naris. I observed his use of the handkerchief, and he informed me that he had always pulled the nose over to the right when wiping that organ.

Treatment.—In extreme cases Bosworth's method would probably be the best that could be followed. In milder cases, however, the treatment might be materially modified, and, although I have operated on a number of cases, I have never found entire removal of the cartilage necessary.

The treatment consisted, first, in producing local anaesthesia by injecting a few drops of 5-per-cent. solution of cocaine beneath the cuticle of the septum, followed by the local application of a stronger solution to the mucous membrane. Then, by pressing the skin of the septum toward the opposite nostril the cuticle of the cartilage was put on the stretch. Thereupon, with a sharp, narrow-bladed knife, the prominent portion, membrane and cartilage together, was split off from end to end. By this means a portion of the cartilage was in each case saved. There was no redundant mucous membrane left, and that portion which had been pressed on the stretch over to the opposite nostril slipped back, in great measure, over the raw surface and covered it. Sutures were not required, and in a few days by simple vaselin dressing the wound healed, leaving the nostril patulous and the naris almost in a normal condition.

CHAPTER XIII.

PERFORATIONS OF THE SEPTUM.

THIS usually occurs through the triangular cartilage, sometimes, though rarely, through the vomer. When in the latter situation, it is believed to be the result of syphilis, scrofula, or malignant disease, or else of traumatism. Perforations of the cartilage are usually of local origin; and, as the majority of cases occur during the later years of childhood, they are probably the result of digital erosions, made during that period, when purulent rhinitis is being gradually transformed into atrophic disease. I look upon this as probable from the fact that the majority of cases that have come under my observation have been atrophic cases, and yet in which the patients could not tell when the perforation had taken place.

Another cause in the scrofulous subject is the projection of the triangular cartilage into one nostril. In this case dust-laden air repeatedly inhaled impinges upon the prominent spot, gradually producing erosion of the mucous membrane and cartilage. By and by crusts form; and the removal of these crusts leaves an ulcerated surface which continues to develop until perforation is the result.

Rosworth looks upon the erosion and perforation as an effect of Nature to remove the obstructive lesion, and the result as beneficial rather than injurious to the health of the patient.

Treatment.—In this matter very little is required. The main point is to keep the perforation free from accumulation of secretions, and not to allow crusts to form upon its margins. If the outline is irregular and jagged, this can be trimmed to produce an even surface, and, as Bishop says, if the perforation produces a whistling sound in breathing, the shape can be altered to allow the air to pass through the opening less noisily. Sometimes the posterior half of the opening will become thick and granular, rendering that part of the septum unusually thick and with a tendency to bleed upon pressure. In this case the parts can be reduced by knife or cautery operation to the respiratory advantage of the patient.

Accidental perforation of the bony septum during operation for the removal of spurs, etc., will sometimes produce severe shock; but

the after-effects are not very serious. Still, it is the duty of every surgeon to do all that he can to avoid an accident of this kind. French perforates the septum to improve the breathing-space when necessary. Wright insists upon proper antiseptic treatment before and after all operative work upon the nose, with which all surgeons, no doubt, agree.

Abscess of the septum is an exceedingly rare disease, but when it does occur it is usually the result of traumatism, and should be treated upon ordinary, antiseptic, surgical principles.

Ulceration of the septum, apart from its occurrence as a prelude to perforation, is also a very rare disease. Still, in scrofulous and syphilitic subjects it does sometimes occur. Likewise in young children, victims of *Ascaris vermicularis*, itching of the nose may be produced by reflex irritation, leading to picking and scratching of that organ until septal ulceration is the result. In all these cases systemic as well as local treatment may be required to cure the disease.

CHAPTER XIV.

HAY FEVER, OR VASOMOTOR RHINITIS.

BOSTOCK, of London, in 1819 was the first among modern writers to draw attention to this disease, although it had been recognized in an indefinite manner by physicians for the previous two centuries. It was observed by him to occur during the summer months among persons working in the vicinity of new-mown hay. From this fact it derived the name which it still bears. That there are two varieties of this disease, one occurring in June and the other in August, and that the symptoms may be provoked by emanations from a multitude of substances, have not militated against the title, inasmuch as the symptoms are in all cases alike.

Hay fever may be defined as a periodic disease occurring annually at a fixed period of the year, and attended by intense hypersensitiveness and hypersecretion from the mucous membrane of the nose, eyes, and throat.

Pathology.—The pathological changes occurring in this disease have long been the subject of careful investigation. During the most aggravated exacerbation there is little, if any, rise in temperature. There is no previous chill. There is no febrile action, and yet the whole system is affected by the violence and suddenness of the explosion. Suddenly, and without warning, a vasomotor paresis is induced. The blood-vessels and venous sinuses of the turbinateds become relaxed and surcharged with blood. There is complete paralysis of the nerves which control exosmosis, and the serum is transuded freely from all the pores of the mucosa.

The length of time during which the veins remain in this state of dilatation depends, according to some writers, upon the quantity of irritant present within the nasal passages. The exciting cause being over, the vessels contract, the exudation ceases, and the parts return to their normal condition, the mucosa retaining only an anæmic appearance.

It is generally believed now that this disease is essentially a neurosis. It affects chiefly persons of a nervous temperament. The

nerves affected are the sympathetic and trigeminus, which control the vasomotor system of the nose. John MacKenzie believes it to be: "A disordered functional activity of the nervous centres"; Joal, Leflaive, and others that it is a reflex neurosis; Delavan that underlying that neurosis there are general or diathetic conditions which tend to the production of the disease. Hence it is pretty generally looked upon as a functional neurosis, but, like other functional neuroses, it never destroys life, and the neuropathologist in consequence is deprived of the opportunity of post-mortem investigation.

Etiology.—Bishop presents the following as a summary of our present knowledge upon this branch of the subject: "Thus, it appears, from the manner in which paroxysms of hay fever are started and developed, that there are three conditions upon which the existence of the disease depends: 1. Abnormally-susceptible nerve-centres. 2. Hyperæsthesia of the peripheral termini of the sensory nerves. 3. The presence of one of a large variety of irritating agents. Exclude one of these conditions, and the paroxysms are prevented. Allay the susceptibility of the nervous centres by certain central sedatives and an attack is averted or arrested; anesthetize the nervous supply of the oversensitive areas and the result is the same. Remove the patient beyond the reach of exciting causes and he is as comfortable as any mortal."

Bosworth also gives three conditions as essential to the production of an attack of hay fever, but they differ somewhat from Bishop's, and they are given in an inverse order. They are: "1. The presence of pollen in the air. 2. A neurotic habit. 3. A morbid condition of the nasal mucous membrane."

1. "Abnormally-susceptible nerve-centres" and the "neurotic habit" may be taken as essentially the same thing, and is probably the primary cause of the disease. Without its presence, to commence with, hay fever would be an impossible thing. What the essential pathological condition is that we term the neurotic element would be difficult to explain. Still, it is well known from extensive clinical examination of hay-fever subjects that the family history, in a majority of instances, justifies the opinion of the presence of abnormally-sensitive nerve-centres in other members of the family likewise, though it may not have been manifested in the same way.

2. Hyperæsthesia of the peripheral termini of the sensory nerves may arise from different causes: such as a morbid condition of certain parts of the nasal mucosa, hypersensitive areas, obstructive

lesions of the septum or turbinateds, or the pressure of overgrowth upon adjoining tissues.

3. The presence of an irritating agent will include Bosworth's first cause: the pollen-in-the-air theory, based on Blackley's investigations. This gentleman was himself the subject of hay fever, usually coming on in June. With the idea that pollen, floating in the atmosphere, might be the cause of it, he undertook a series of experiments to ascertain the truth of his theory. His most successful experiments were by the use of a small disk of glass, coated with glycerin and suspended in the air. He found that in twenty-four hours, in the beginning of June, but a small number of grains of pollen would become attached to the disk. By about the tenth they would have increased about tenfold, and the hay fever would have commenced. Inside the next three weeks the grains of pollen would again be tripled, with marked increase in the severity of the symptoms. From this time forward the pollen, and with it the hay fever, would subside, until by August 1st both would disappear. If heavy rains occurred during the prevalence of pollen, they would temporarily diminish in number, and the symptoms for the time being would also subside, while both would return as soon as there was a chance for the grains to rise again in the air.

Experience, however, does not confine the local irritant by any means to pollen. We find many of our cases residents of our large cities, where little pollen can be possible in the air of respiration; no doubt the coincidence of the prevalence of hay fever at the period of the year when the atmosphere is most loaded with it would indicate a causative relation as existing between the two. But there are many irritants, physical and even mental, which may induce an attack. The presence of feathers, odor of animals, perfumes; hot, impure air; sudden change of temperature, mental worry, even exposure of the spinal column to the air have all induced exacerbations of the disease. So true is this that a violent attack has been known to be induced in an old hay-fever patient by merely gazing upon a picture of a field of new-mown hay.

Although we can understand the presence of an irritant to be the original exciting cause of the first attack, yet it is difficult to believe that each exacerbation is dependent upon the same exciting cause. For instance, a patient, after a paroxysm of sneezing, and profuse flow of serum from the nostrils, and profound tickling irritation of the palate, will retire to bed under a sense of complete relief.

Everything is done to render the air of the room pure and free from irritants. The night is hot and he can bear nothing but a sheet over him. I am speaking of a case with which I am perfectly familiar. That patient knows by experience that if he lies perfectly still upon his back, with all his body, hands, and feet covered with the sheet, he will be able to lie for hours, and even to sleep, before another exacerbation will appear. But, warm as it is, if he exposes a foot or a hand from beneath the covering, he knows that another attack of sneezing will come on at once, and that he will saturate two or three more handkerchiefs before it subsides.

What has pollen, or dust, or foul air, or feathers, or animal odor to do with this?

I know a case, also, of a gentleman who has a periodic attack of hay fever for a month every year, commencing near the end of August. His worst exacerbations occur during the night-time; but he can go daily and sit to read in a large public garden, filled with flower-beds and exotics, without feeling any inconvenience from the pollen rising from them.

I do not wish in any way to deprecate the importance of pollen or any other irritant as exciting causes of this disease, but I do wish to emphasize the fact, that there must be something inherent in the system, when the disease has once developed, which itself produces these periodic explosions, from which hay-fever patients so severely suffer.

Shaw Tyrrell, of Toronto, and Bishop, of Chicago, have for years, independently of each other, been advocating a new theory as to the cause of hay fever. They believe that to some extent it is caused by the presence of an abnormal amount of uric acid in the blood. According to this theory, the formation and retention of uric acid in the tissues does not produce hay fever, but the presence of uric acid in the blood does.

The majority of cases of this disease occur between the ages of ten and forty years, and, in accordance with Bosworth's statistics, the majority, in the ratio of two to one, are males.

Another important point, upon which all writers agree, is that it is a disease incident to the educated classes and sedentary life. This is what we might expect when we remember that hay fever is so largely a neurosis.

Symptomatology.—Slight premonitory symptoms in the form of tingling or itching of the eyelids, nasal passages, or soft palate may

present themselves for days before the disease fully develops. Then spasmodic fullness of the nose will occur, sneezing will come on, and the congestion will find relief in profuse watery discharge. The eyelids and eyeballs become congested, and copious lacrymation adds to the general distress. The discharges are often profuse and the sneezing very violent and continuous. Another symptom, often present, is an intense tickling irritation of the soft palate, inducing an irresistible desire to scratch it with the tongue, even when the patient knows from experience that the very friction of the tongue on the soft palate will increase the rapidity of the sneezing.

The hydrostatic condition of the turbinateds is particularly manifest during an attack of hay fever, the paresis having deprived the tissues of their normal power of resistance. Let the patient lie on one side, in a very few moments the corresponding nostril will be completely stenosed. Let him turn to the other, and the condition will be at once reversed. Let him lie on his back, and the posterior ends of the two inferior turbinateds will become so swollen that they will fill both posterior choanæ, and breathing through the nose will be an impossibility.

Many cases of hay fever, after the first few years, also take on the element of asthma, to increase the sufferer's misery. This comes on two or three weeks after the commencement of the symptoms; and in some cases will last for weeks after the hay fever proper has subsided.

It is a question whether the asthma owes its origin to hay fever, or whether they are not both the products of the one cause, producing vasomotor rhinitis in the upper region and vasomotor bronchitis in the lower.

One remarkable peculiarity of hay fever is its exact periodicity. Quite frequently it will come on year after year almost to the very day, usually about the 20th of August, and last for four or six weeks, or until the advent of cold weather, and then disappear almost as suddenly as it came.

Examination of the nasal passages during an attack reveals the turbinated bodies swollen and water-soaked and of a gray or purplish hue. The mucous membrane is painful and sensitive, while the necessity, which so often exists, of sleeping with the mouth open renders the throat dry and parched.

Throughout the United States and Canada the usual period of attack is during the latter half of August; but with some people,

though they are greatly in the minority, the attack comes on in June, bearing the name of "rose-cold," from the fact of roses blooming at that time.

In other instances, though these are likewise rare, the attack comes on semi-annually. I have one lady patient who for years had a light attack in March, to be followed by a severe one in August. The latter still continues, followed or accompanied by asthma, while the former has during recent years disappeared.

With regard to geographical area, it is found on this continent over almost all parts of the United States and Canada. There are certain regions, however, said to be exempt, such as the White Mountains, the Adirondaeks, Manitoulin Island, parts of Muskoka, the vicinity of Quebec, etc. But it is said, also, that, as urban life extends into these regions, their former immunity may gradually pass away.

Diagnosis.—Perhaps acute rhinitis is the only disease that it is likely to be mistaken for. In this, however, the chances of error are slight. In acute rhinitis the mucous membrane is bright and red, with no great amount of swelling. In hay fever the color is a grayish or purplish red, and the swelling a leading feature. The discharge in acute rhinitis is muco-pus of a yellowish color; in hay fever it is little but colorless serum.

Prognosis.—Hay fever rarely, if ever, produces a fatal result. Still, while it lasts it causes much intense suffering. In some cases during the process of years the attacks of themselves become gradually lighter and finally disappear; but in the majority, if unrelieved by treatment, they culminate in asthma of a severe and continued form. The disease is, however, more or less amenable to treatment, and a large percentage of cases have been reported cured.

Preventive Measures.—As a preventive measure, nothing occupies so prominent a position as the removal from home-surroundings to a locality where hay fever is said not to exist. Of such regions those already named bear a high reputation, particularly the White Mountains. Bethlehem seems to be a favored spot in these mountains. The elevation is less than 2000 feet, but large numbers of people annually spend the whole of the hay-fever season there, and claim, during their sojourn, almost complete immunity.

The Muskoka islands and lakes have also during recent years received a good deal of attention as a hay-fever resort. The elevation of 1000 feet above the sea, the purity of the waters, the rocky and

sandy nature of the soil, the abundance of woodland, and the teeming variety of the innumerable islands have all helped to make it an ideal region for the prevention, as well as treatment, of this disease.

The upper waters of the Saguenay, though lower in elevation, is also gaining in reputation, particularly among sufferers directly to the south of this romantic region; as also is Georgian Bay, with its pure, dry atmosphere, and thousands of rocky islands.

The most important fact to be considered, in connection with this view of prevention, is the advisability of moving to the chosen spot before the commencement of the annual attack. The object is to get the entire benefit of the climatic change; to prevent the disease from developing, not to break it up after it has made its appearance. Another point which cannot be too strongly emphasized: if the patient goes by railroad to the favored resort, *before* the time of the annual attack, even if that period is only a few days, the symptoms will not develop during the journey; but if the trip is made *after* the hay-fever symptoms have commenced, they will be materially aggravated by the time he reaches his destination.

The results arising from this method of prevention differ materially. In some cases the occurrence of the disease for the season is broken entirely; in others the severity is weakened and the period of the attack shortened; while in others little or no salutary effect is produced. They may go the round of all the resorts they can hear of, and yet the hay fever will exhibit itself with its old-time force and duration.

Treatment.—This will frequently require to be of a threefold character 1. Constitutional treatment, for the correction of the neurotic habit 2. Treatment of the diseased condition of the nasal passages. 3. Treatment of the spasmodic attack.

1. Constitutional treatment. In this, regulation of the alimentary canal and the urinary system may be of prime importance, and should be followed by the administration of nerve and systemic tonics, such as iron, quinine, strychnine, arsenic, and phosphide of zinc. Cold bathing practiced daily is an excellent adjuvant, as is also systematized exercise.

Bishop, basing his conclusions upon his own theory of the presence of uric acid in the blood as the real cause of the disease, administers systemic treatment under the title of preventive treatment. In the first place, he reduces as much as possible the supply of foods that increase the formation of uric acid, such as meats, sugar, beer,

wine, etc.; and limits the diet largely to fruits, vegetables, milk, fats, etc.; and at the same time administers salicylates for several weeks prior to the onset of the disease, in order to diminish the uric acid as it forms.

The moment, however, that symptoms of hay fever show themselves, he drops the salicylates and reverts to acid treatment. After numerous experiments, he prefers Horsford's acid phosphates, which he gives in 4-gramme doses two or three times a day. He claims that this prevents the solution of uric acid in the blood, and at once checks the disease, while, on the other hand, if alkaline treatment were resorted to at this time it would produce uricacidemia and precipitate an attack of the trouble he is trying to prevent.

2. Treatment of the diseased condition of the nasal passages. In many cases the hyperæsthetic condition of the mucosa depends upon intranasal lesions of one form or another. It is self-evident that this diseased condition should be removed and the passages rendered normal if possible. Deflections of the septum, hypertrophic rhinitis, nasal polypi, pressure of the middle turbinated upon the septum may any of them require operative interference; and the treatment should be directed toward the removal of these conditions when present, according to the methods already indicated in previous chapters.

As regards the period best suited to operation, it would, without doubt, be better to remove all obstructive lesions prior to the annual onset of the disease. As a rule, however, the patient does not present himself for treatment until the severity of the exacerbations impel him to seek relief. When he does come, his case should be examined into thoroughly, with the aid of the necessary rhinoscopic instruments. This can always be accomplished, even in the most sensitive cases, after applying a 4-per-cent. solution of cocaine. The essential theory is, first, to render each nasal passage free enough to allow of normal respiration through it, and, second, to remove any pressure upon the septum arising from turbinal hypertrophy. At the same time it is always well to be guarded against too extensive operative interference, and, except in extreme cases, it would be better not to operate during the actual presence of this periodic disease.

Sajous and MacKenzie believe that there are sensitive areas, independent of hypertrophy, and that slight galvanocautery operations upon them will destroy the terminal filaments of the nerves for the time being and thus check the exacerbations.

3. Treatment of the spasmodic attack. No treatment while the

exacerbation is actually on will give such prompt relief as a spray of a solution of cocaine. At the same time no drug is more dangerous to the patient, if he becomes addicted to its indiscriminate use. Wherever there is vascular turgescence of the nasal mucosa, from any cause, the application of a solution of cocaine will at once remove it; and in hay fever the attendant symptoms are, for the time, relieved likewise. In most cases the following prescription will be quite strong enough:—

1	R Cocaine hydrochlor	3
	Ammon. chlorid.	13
	Aqua	30
M. Sig: Spray each nostril with a small quantity and allow it to be retained. Any good atomizer as Figs. 25, 26, and 27) would answer for spray treatment.		

One difficulty, apart from the danger of acquiring the cocaine habit, which can only be slight in the use of so weak a solution, is the fact that its action is only temporary, and, after being used a number of times in succession, the reaction from the condition of the vessels produced by it becomes rapid and noticeable. That is, the tissues swell up again even more quickly than they did before its use. Here, again, to prolong the efficacy of the cocaine, good results can be obtained from a 2-per-cent. solution of menthol in albolene, thrown up the nostrils by a second atomizer, as soon as the cocaine has been absorbed.

There is another method of treatment I have found very satisfactory, in which cocaine has not been used at all, except for the purposes of examination. This is by using a much stronger solution of menthol in albolene as spray to the throat only—inhaling it forcibly during a full inspiration, and then closing the mouth and breathing out through the nose. This is repeated over and over again until relief is obtained. The strength of the solution might be 3, 4, or 5 per cent. as the case might require, repeated, irrespective of time, night or day, upon the approach of each threatened exacerbation.

There are a number of menthol-inhalers in the market, but usually the use of the spray is attended by better results.

Bishop advocates the use of a 1-per-cent. solution of camphor-

1.	R Cocaine hydrochlor.	.gr. v.
	Ammon. chlorid	.gr. ij
	Aqua	.3j.
M.		

menthol in lavolin as a spray to the nose in this disease, gradually increasing the strength to 3 per cent. if required. He claims it to be blander and more soothing than menthol alone. I have used it on many occasions, but still prefer the menthol and thymol-menthol preparations. Of the latter the following is a good formula:—

1. R Thymol	15
Menthol	15
Albolene	30
M.	

This should be used as a spray to the throat and diminished to one-half strength when used to the nose.

Lennox Browne has more faith in the local application of menthol than of any other drug in the relief of this disease.

E. L. Shurly has found snuff of daturine in starch a very efficient remedy; while Fletcher Ingals, after cauterization, administers tonics, together with the local application of cocaine, to relieve the exacerbations.

In severe cases, when, from business engagements or other circumstances, it is impossible to use spray-treatment of any kind to relieve the exacerbations, minute crystals of menthol dissolved in the mouth will efficiently keep the symptoms under control.

As direct sedatives to the mucous membrane administered internally perhaps none are better than a combination of atropia and morphia in minute doses. They have a quieting effect upon the nervous system, as well as an astringent effect upon the mucous membranes. The following is a good formula:—

2. R Atropia sulph	013
Morphia sulph.	65
M. Make into 100 tablets.	
Sig.: One to be taken every two, three, four, or six hours as required	

Still, as with all narcotic sedatives, cocaine included, considering the danger that is always present of forming a habit, the less of these medicines that are given to the patient, the better. When

1. R Thymol	gr. ij
Menthol	gr. xxij.
Albolene	3j
M.	
2. R Atropia sulph	gr. $\frac{1}{2}$.
Morph. sulph	gr. x.
M. Make into 100 tablets	

absolutely necessary the drug should be prepared in the doctor's office, and not in the way of prescription.

Solis-Cohen and Wagner speak highly of suprarenal-capsule extract in the treatment of this disease. Solis-Cohen administers the extract in 5-gramme doses five times a day, insuring thereby a "sneezeless, coryzaless" night. Wagner favors its local application to the turbinal tissues, with or without cocaine, obtaining excellent results.

NASAL HYDRORRHOEA.

This is an affection somewhat resembling hay fever, particularly in the abundance of the serous discharge. It is very rare and occurs at irregular intervals. the name indicates the nature and symptoms of the disease. The discharges, however, are more of a passive character than in hay fever, and unaccompanied by the severe sneezing and palate-irritation which attend that disease. It seems to arise from idiosyncrasy of constitution. Sometimes it is a forerunner of nasal polypi. How far it may stand in a causative relation to it at present it is impossible to say. Treatment similar to that of hay fever is called for; electrolysis under cocaine anæsthesia may be useful, and operative treatment for removal of obstructions may sometimes be required.

A case of "vasomotor rhinitis" reported by Howard Straight, although accompanied by severe sneezing, I think should really come under this head. The attacks were similar to those of hay fever only for the facts that they come on more frequently during wet weather than dry, and, lasting a day or two, occurred about every two weeks all the year round. A number of handkerchiefs would be saturated with each attack, and all ordinary treatment failed to give relief. Finally the doctor, finding the entire nasal passage, turbinateds included, in a normal condition when the attack was off, singed the inferior turbinateds lightly with the flat galvanocautery electrode. The result was a great improvement of the condition, with almost complete subsidence of the attacks.

St. Clair Thomson has very recently drawn attention to the possibility of mistaking escape of cerebro-spinal fluid for nasal hydrorrhœa, the symptoms being somewhat alike. A number of cases are recorded in which, in otherwise perfectly healthy subjects, cerebro-spinal fluid would escape almost continuously from the one nostril, the intermissions being rare. In true nasal hydrorrhœa the discharge is more irregular and at the same time bilateral.

CHAPTER XV.

ANOSMIA; PAROSMIA; FURUNCULOSIS.

ANOSMIA.

THIS disease, indicating loss of the sense of smell, may owe its origin to either central or peripheral lesions or to mere functional disturbance of the nerve-centres. When of central origin it may arise from the pressure of a tumor on the double nerve-centre, or upon the nerves themselves, as in Foder's case, in which the pressure arose from scirrhus of the pituitary body. Appert's case also arose from pressure upon the olfactory nerves by abscess of the pituitary. Bonet's case was caused by pus-formation within the olfactory bulbs. It may arise also from atrophy of the bulb or trunk of the nerve as a functional result of insanity and as the result of lesion caused by fracture of the bone of the base of the skull.

By far the larger number of cases arise from peripheral compression or lesion, or from causes that will prevent the contact of odoriferous particles with the olfactory area of the nose. The causative effect of lesion of the terminal nerve-filaments is well illustrated in cases of atrophic rhinitis and malignant disease. Here the nerve-endings are destroyed, in the one case by atrophy, in the other by the substitution of neoplasm. In all cases of anosmia the sense of taste is likely to be impaired. Excessive tobacco-smoking will sometimes impair the sense of smell. The pressure of nasal polypi not infrequently will destroy the sense also.

When the anosmia is the result of atrophic rhinitis, a thorough and systematic treatment of the latter is not infrequently followed in the end by restoration of the olfactory sense. Joal records two cases as cured by douches of carbonic acid. He applied it through a caoutchouc tube, the effect being first, irritant and then resolvent.

When the cause is central, there is little hope of cure. Still, the galvanic current may be useful and also courses of treatment by nerve-tonics such as strychnine, arsenic, iron, and phosphorus.

In cases associated with hysteria and insanity the affection is of

minor moment, and, as a neurosis, may disappear with the restoration of the mind to a normal condition.

PAROSMIA.

This disease, although very rare, may manifest itself in various ways. One of the most common is that of hyperæsthesia of the olfactory nerve, by which the patient perceives natural odors with exaggerated intensity. This occurs chiefly in hysterical subjects. Another way is by perversion of the natural function. The olfactory impressions in cases of this kind are usually of an unpleasant character. The odors complained of are disagreeable, such as carrion, kerosene, greasy rags, etc. It is said that this perverted olfactory function is not infrequently found among epileptics and the insane.

Treatment.—This should be on similar lines to those required in the treatment of anosmia. Still, as its origin is more likely to be central, the prognosis is not so favorable.

FURUNCULOSIS.

Small boils within the anterior nares are not by any means infrequent. They produce soreness, redness, and swelling of the end of the nose. They occur most frequently at the outer margin of the vestibule or the inner side of the ala, having their origin in diseased hair-follicles. The most notable symptom is general soreness of the part, with sharp pain produced by blowing or handling the nostril.

Treatment.—Systemic and local treatment, based on general principles, is recommended. A local application of a 20-per-cent. solution of camphor-menthol in lavolin is recommended by Bishop; also a 12-per-cent. solution of carbolic acid in glycerin. When pus is found, he recommends evacuation, followed by application of yellow-oxide-of-mercury ointment.

I have found a simpler treatment speedily efficacious. When the little boil, or furuncle, is forming, before pus can have developed at all, a sharp needle should be pressed deeply into its centre. This can be done by the patient without the aid of the surgeon. Then, by vigorously blowing, blood is freely evacuated. This blowing should be repeated a number of times in quick succession. If blood does not appear, the little operation should be repeated until it does. The evacuation will have relieved the congestion, and healing takes place at once without after-treatment.

CHAPTER XVI.

EPISTAXIS.

THIS term is applied to all cases of nasal hæmorrhage whatever the origin may be. It is of frequent occurrence in childhood; but much rarer in adult life.

Pathology.—The bleeding usually arises from erosion or rupture of the minute blood-vessels, and in the majority of cases comes from the lower portion of the cartilaginous septum. Chiari believes the majority of cases, particularly in adult life, are tubercular. He gives a record of six, in all of which the microscope proved the tubercular nature of the disease. Hard granulations or tumors had formed on the septum and from these the bleeding had occurred. In malignant disease hæmorrhage may be severe, from any part of the neoplasm, and the same is true of fibroma, only that in the latter spontaneous hæmorrhage is more rare, owing to the density of the fibrous tissue. Undoubtedly many cases occur without the system in any way being involved.

Etiology.—In children the most frequent causes are falls and blows upon the nose. Picking the nose and the insertion of foreign bodies also give rise to it. In deviation of the septum the erosion of the prominent point of the cartilage by particles of dust may produce bleeding, as also may fractures of the nose or the base of the skull.

Sometimes the hæmorrhage may be vicarious in place of suspended menstruation. When occurring after the menopause, it may be considered an effort to relieve the distended blood-vessels.

At other times it may arise from constitutional cachexia, such as pernicious anemia or purpura hæmorrhagica, or again from organic disease of the heart or kidneys, as a premonitory sign of typhoid, and, as already said, as the result of septal tuberculosis.

Symptomatology. It often occurs without premonitory symptoms. In other cases prodromic symptoms of vertigo, headache, throbbing of the temples, etc., precede the venous discharge. Profuse arterial bleeding rarely occurs, except from malignant disease.

fibroma, or traumatism. As a rule, the hæmorrhage occurs only from one nostril.

Diagnosis.—In this there should be no difficulty if the bleeding occurs while the patient is in a conscious condition. Frequently, however, slight hæmorrhage will occur in the night. If the patient is asleep in the supine position no discharge may escape from the anterior nares. Posterior rhinoscopy even in these cases should remove the doubt.

Prognosis.—In minor bleeding the prognosis is always favorable. In diphtheria and the latter stages of typhoid it is not so hopeful, while hæmorrhage occurring in malignant disease and purpura may be considered as unfavorable indications.

Treatment.—If the attack is mild, sitting quietly in a chair with the head tilted slightly backward will often arrest the bleeding. If the patient bends his head forward to cleanse the nostrils of the clotted blood, hæmorrhage will commence again; but, let him blow out the accumulations and at once resume the former position, it will be likely to soon cease.

Cold to the spine, hot applications to the external nose, hot-water douches to the nostril, pledgets of cotton soaked in glycerotannin or tincture of iron have all been recommended. It is rare, however, that active treatment will be necessary.

When bleeding threatens to be severe, it is well by means of the nasal speculum and reflected light to search for the bleeding-point and to pack the spot firmly with cotton pledgets alone or saturated with astringents already mentioned. In these cases kite-tailed tampons answer an excellent purpose. Small pieces of aseptic absorbent cotton are tied together by a string at intervals of one inch and a half from each other. They are all then, after cocainizing the mucous membrane, packed one after another into the bleeding nostril by means of cotton holder or small curved forceps, until by pressure the hæmorrhage ceases. The plug is retained for twenty-four or forty-eight hours. After that the whole or part of the pieces may be withdrawn by gentle traction, a portion being retained to the third day if the return of hæmorrhage appeared to be probable.

In anticipation of the latter, Ingals suggests the use of a strip of iodoform gauze as less likely to become offensive during a prolonged retention.

For deep packing Gleason also uses a long strip of gauze, soaked in one of the hydrocarbon oils and packed, fold after fold, back as

far as the posterior choanæ. Another method, which he considers equally efficacious, in the checking of deep hæmorrhage, is to soak a loose piece of absorbent cotton in a 15-volume solution of peroxide of hydrogen, and to press it along the inferior meatus to the posterior naris, as in the first method. He claims that by this means posterior packing can be avoided.

In post-rhinal hæmorrhage from malignant or fibroid diseases these methods may all fail; then Bellocq's cannula (Fig. 55) will do excellent service. The objection to this instrument when first introduced was on account of the curve in the tube. That, however, has vanished, as the instrument now in use is almost straight. The object aimed at is to plug the posterior naris of the bleeding side first and the anterior naris afterward. The cannula is threaded with a strong cord through the eye of the spring. The thumb-screw is next

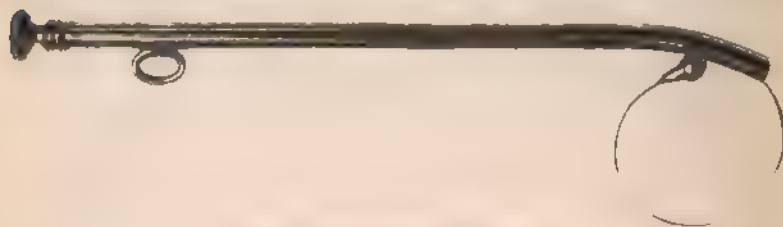


Fig. 55. Bellocq's cannula.

adjusted so that it will retain the spring within the cannula. Then the instrument is passed along the floor of the inferior meatus until the end projects beyond the velum. The spring is now touched and the cord is at once seen within the mouth. To this cord is fastened a pledget of wool large enough to fit the posterior naris. Then the cannula is withdrawn, the wool pulled through the nostril into position, and cut loose. In drawing the cotton through the naso-pharynx it can be guided in its course by the finger of the left hand of the operator.

It is claimed that the cotton plug should be large enough to fill both posterior nares, as otherwise the hæmorrhage might continue from the free side. This looks like false logic, as there is no natural communication between the two passages.

In a case of a severe hæmorrhage from nasal fibroma, the only occasion in which I have ever required to use this instrument, I

plugged the one side only, followed by immediate cessation of the hæmorrhage.

Another plan of treatment worthy of mention is the insertion of a soft-rubber bag deeply within the nasal cavity, and distending it with compressed air.

Continuous hæmorrhage from ulcerated nodule of the cartilaginous septum is best controlled by careful singeing down of the nodule with the galvanocautery. The spot should then be constantly anointed with vaselin until healing takes place. There should be no recurrence.

CHAPTER XVII.

RHINOLITHS; FOREIGN BODIES; PARASITES.

RHINOLITHS.

A RHINOLITH is a nasal calculus. It is formed by the gradual deposit of the mineral constituents of the normal nasal secretions upon the surface of some foreign body, located within the nose and acting as a nucleus.

The earliest record of one being removed was reported by Gardi in 1502. It was indefinitely described as being as large as a fir-cone. During the four centuries from then until now more than a hundred have been chronicled. Still, rhinoliths are of rare occurrence and they occur so infrequently that each individual case is usually considered worthy of a record by itself.

In the matter of history, they follow the same law that governs the formation of calculi in the bladder and other organs of the body, and in most instances some trace of nucleus can be found. It usually takes many years from the insertion of the original foreign body in the nasal cavity to the full development of the rhinolith, as seen when the patient applies to the surgeon for relief.

Symptomatology.—Sometimes from their size and position they give rise to great deformity. In Hendley's case the nose was swollen and there was an external sinus from which pus exuded; in Bovill's case facial paralysis and destruction of the hard palate. In Hill's case the rhinolith was very large and had caused extensive rhinitis caseosa. In Marsh's case there was marked deviation of the septal cartilage to the left, behind which the calculus lay concealed. One of the writer's cases, a girl of 19 years, was similarly affected, but in her case it was on the right side. On removing a portion of the hypertrophied and deviated cartilage the stone was discovered behind. It was broken in fragments and removed. The nucleus had been a cherry-stone pushed into the nose when the patient was six years of age. In the other case of which an illustration of fragments of exact size is given (Fig. 56) the stone was exceedingly large. It

filled the whole of the inferior meatus and had to be broken up before it could be removed. The nucleus was a button, as shown in the upper right end of the figure.

One prominent symptom attending all cases of long standing is a sanious, muco-purulent discharge of peculiarly unpleasant odor. It is almost characteristic of the disease and quite different from that produced by atrophic rhinitis.

Diagnosis.—As the development of rhinolith is a slow process, they rarely come under observation until adult life. By this time, from their size, the symptoms become severe. In childhood any hard substance found within the nose is likely to be a foreign body, without the calcareous deposit, although both Clark and Baber report cases occurring in children.

In direct examination the gritty sensation produced by the touch of the probe is indicative of calculus. When curvature of the septum, as in the two cases related, hides the stone from observation, the im-



Fig. 56. Rhinolith removed from the left nasal passage of a lady aged 28, nineteen years after the insertion of the button into the nostril.

pediment may require to be removed before the diagnosis can be made sure.

Prognosis.—The enlarged calculus can never be removed except by operation. Surgical relief by one means or other is always possible.

Treatment.—This is simply the removal of the rhinolith like any other foreign body. This can rarely be accomplished without the crushing or breaking-up process. Fortunately they are not often dense enough to resist the force of compression-forceps, and when that density does exist small lithotrites may be used instead.

Some operators have found it necessary to enlarge the nasal orifice by incision. Others have cut through the soft palate or perforated the hard palate to facilitate removal. But these cases occurred in earlier years; and, with the improved facilities of cocainization, examination, and surgical treatment of the present time, the surgeon should not require to resort to any efforts *save per vias naturales*.

After removal of the rhinolith there may be some hæmorrhage

caused by contusion of the soft tissues, but healing is always rapid. Odor entirely disappears and the catarrh almost at once ceases.

FOREIGN BODIES

Foreign bodies are put in the nose by children, sometimes by hysterical females, and occasionally by insane persons. They have been known also to enter the nose during sudden inspiration, and to have got there by accident of one form or another. In the act of vomiting masses of undigested food have been thrown up behind the palate and into the nasal fossæ. Bosworth relates an instance in which he removed a deciduous tooth from a gentleman's nose, which had loosened and been swallowed when a lad. It had probably been vomited and thrown into the naris, causing purulent rhinitis for twenty-five years before the doctor was called to remove it. Lowndes tells of a ring being impacted in the posterior nares of a child of 15 months. It was too large to have got there through the nostril. Cotton tampons have been removed after remaining in the nose for years. Young children frequently put buttons, peas, pebbles, etc., into the nose.

Sometimes if they give little trouble nothing is said about them. If discovered within a year or two they may be found unchanged. But, as is mentioned in the first part of this chapter, if retained, they, in course of time, become the nuclei of rhinoliths.

Symptomatology.—Profuse sero-mucous discharge accompanied by sneezing are the earliest symptoms. There may also be pain, particularly if the object is rough, angular, or large. Subsequently the discharge from pressure may become muco-purulent and of offensive odor. Obstruction is also a prominent symptom, arising partly from the pressure of the foreign body and partly from swelling produced by the irritation. Toleration, however, in many instances soon occurs, as the body usually lodges in the inferior, or largest, meatus—a region less liable to irritation than the olfactory areas above. The sense of smell is rarely affected.

Diagnosis.—This can only be made by direct inspection when the patient is either ignorant of the fact or unwilling to tell what he knows. Cocaine should always be used during examination, as it performs the double duty of shrinking the tissues and at the same time relieving their sensibility. With the use of a probe aided by reflected light and nasal speculum, there should not be much difficulty

in diagnosis. In young children a general anæsthetic might be required. The touch of the probe should distinguish it from calculus, while thorough examination should remove all neoplasms by exclusion.

Treatment.—An anæsthetic will be required during removal in



Fig. 57.—Spoon.

most cases occurring in young children, but in some complete anæsthesia may not be necessary. The application of a drop or two of solution of cocaine to the mucous membrane will shrink the tissues and facilitate extraction



Fig. 58.—Bosworth's nasal forceps.

A nasal spoon (Fig. 57) in the majority of instances will readily remove the object, though sometimes mouse-toothed or curved nasal forceps may be required (Figs. 58 to 60). When these fail a snare



Fig. 59.—Alligator-forceps

may possibly be slipped over some projecting point, and render the extraction easier than by any other method.

PARASITES.

The presence of extraneous or parasitic life within the nasal cavities is very rare in temperate climates, so rare that many rhinolo-

gists have never seen a case, while in tropical countries it is comparatively frequent. In India alone Lahory collated 91 cases, 2 of which were fatal. In Cloquet's case, a man, after sleeping in an open field, was seized with severe pains in the forehead and with swelling of the face. He was taken to a hospital. Worms commenced to crawl about his nostrils and ears; and on lancing the swollen tissues several platefuls are said to have been taken away (Bosworth). The patient recovered with the loss of his eyes.

Fraenkel says that in temperate climates the presence of ozæna is favorable to the growth of parasites, and that the most active entities in producing the malady are the *Musca vomitoria*, the *Musca carnaria*, and the gadfly.

Goldstein, in the *Laryngoscope* for December, 1897, graphically



Fig. 60. Hartmann's forceps

introduces a new insect to the notice of his professional brethren. This is the *Comptosia marcellaria*, or Texas screwworm-fly. Professor Williston, of Yale, says that it prevails everywhere from Canada to Patagonia.

This pest usually confines its ravages to cattle, but sometimes it invades the nasal passages of human beings. Several deaths have been recorded from its effects. In all the known instances, however, in which the eggs of the screwworm have been deposited in the nose or ear there has been either pre-existing ozæna or otorrhœa. The fly deposits its eggs upon decaying animal or vegetable matter, and upon this the fly feeds voraciously.

Symptomatology. The symptoms in all cases are pretty nearly alike. These are excessive irritation, excruciating pains, formication, and the appearance of the maggots crawling within the nasal cavities.

They are very tenacious of life, and will stick to the walls of the passages with great tenacity. Muco-purulent and bloody discharges soon follow, accompanied by headache, fever, and other constitutional symptoms. When death occurs it is probably due to the supervention of cerebral meningitis, possibly aided by the development of septicæmia, from the extensive suppurations which sometimes occur.

Treatment.—The best treatment is to curette and pick out the larvæ. The screwworm is said to be so tenacious of life that it will live for several minutes in pure carbolic acid. The vapor of chloroform, if concentrated, will kill them; but care would be required lest in zeal to destroy the parasite the patient should be sacrificed. Ordinary washes and sprays are useless. Rigid watchfulness, with oft-repeated extractions of the grubs, aided by cocaine and reflected light, would appear to be the best treatment.

Schappegrell advises the use of warm oil. He says it destroys the larvæ by occluding their respiratory organs. He places the patient in the horizontal position, and fills the nostril with the fluid: olive-oil, albolene, glycolin, etc., and claims to eradicate the worm by careful and painstaking use of this means.

CHAPTER XVIII.

NASAL POLYPI.

THESE are tumors of the nose, presenting several marked characteristics. They have smooth surfaces, are lobulated, but usually are regular in form, each being attached by its own broad or narrow pedicle. The color is grayish blue, sometimes slightly pink. They are tense and elastic to the touch, and are of jelly-like consistency.



Fig. 61.—Nasal polypi. (After Bosworth.)

They rarely appear simultaneously for the first time in both nasal fossæ, but attack one nostril first. Sometimes, through a long course of years, the other one is never invaded. In other instances the development of polypi on one side is quickly followed by their formation on the other (Fig. 61).

Pathology.—This is a subject in which there exists, particularly among recent writers, a considerable difference of opinion.

Bilbroth classes nasal polypi with the adenomata; Bosworth, (116)

Erichsen, and Butler consider them to be myxoma; while J. N. Mackenzie says that the change from the normal is not myxomatous, but that of simple inflammation. He says that the ordinary mucous polypus is an oedematous fibroma, not a myxoma. Jonathan Wright also, after extensive microscopical examinations, has arrived at the conclusion that true myxomata are never found within the nasal chambers, and that the growths usually called by this name are simply the results of chronic inflammation. He finds that, in addition to the degeneration of the stroma and the oedematous infiltration so generally present in nasal polypi, there are also occasionally hyaline bodies or berries. They are confined almost entirely to the stroma, and vary in size from that of a round, white blood-cell to three or four times that diameter. "These bodies are divided symmetrically by sulci, which reflected the light strongly into lobules, compressed into polygonal shapes, apparently by a limiting membrane" (Jonathan Wright).

Swain has proved histologically that polypi having surface corrugations contained a large amount of fibrous tissue, and that, whether in their origin they had a purulent basis foundation or not, no bacilli, cocci, or parasitic bodies seemed to be present in their tissue. Swain's observations seem to have brought out an additional fact: that the histological character of the polyp bears a direct relation to the density of the tissue upon which it grows. He also believes their origin to be inflammatory, involving the pre-existence of an hypertrophic condition of the mucous membrane.

Notwithstanding differences of opinion upon fundamental principles, there are certain pathological conditions in which all agree. The external surface of the polypus is composed of an epithelial layer similar to that of the ordinary mucosa; it may be mixed in character, or either squamous or ciliated, according to circumstances and situation. Within this there is hypertrophy of the structural elements of the mucous membrane and connective tissue, giving a fine reticular frame-work, the meshes of which are filled with semifluid mucin and leucocytes. Glandular tissue may be present, but there is usually a minimum of vascular elements (Fig. 62).

The site of attachment is usually the internal surface of the middle turbinate. It may be around the margin of the ostium maxillare or along the whole of the lower border of the bone. Sometimes they are attached to the inferior turbinate and occasionally to the septum; but these instances are rare.

Etiology.—Although this subject has engaged the attention of so many keen observers, as has already been said, they do not all agree. The probability is that there are many causes which may lead to the development of this disease. The fact that the mucous mem-

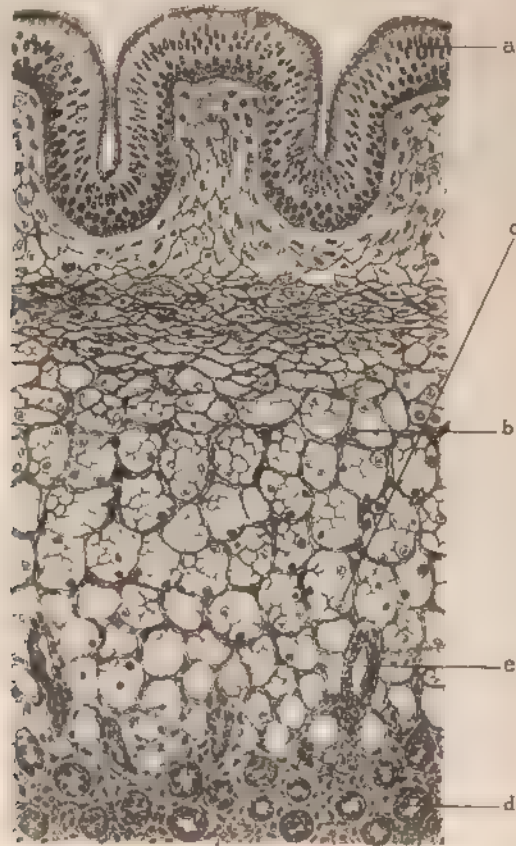


Fig. 62.—Microscopical section of nasal polypus (200 diameters).
a, Stratified ciliated epithelium. *b*, Reticular frame-work. *c*, Polynuclear leucocyte. *d*, Vascular centre. *e*, Radiating blood vessels. (Author's specimen by Bensley.)

brane of the middle turbinate is of softer and more delicate consistency than that of the lower, and composed of a finer reticular tissue, may make it more liable to this so-called myxomatous hypertrophy. In a normal condition the tissues of the middle turbinate

are in constant condition of serous exosmosis. The membrane in some cases may be easily overdistended, and, if from any cause inhibition is lost at a given point, there is nothing to prevent the distension increasing, with proliferation of cell-elements.

Woakes believes the large majority of cases to be the result of necrosing ethmoiditis, while Grunwald considers the formation of polypi to be secondary to empyema of the accessory cavities. McBride considers them to be simply oedematous fibromata, to be distinguished from papillomata by their density, color, and site of origin, but to be the same in character and cause. Zuckerkandl suggests that they originate as adenomata, but that during development some of the ducts become occluded, resulting in myxomatous degeneration of glandular tissue. Somewhat in opposition to all these views, Jonathan Wright and Swain, of this continent, maintain that the disease is, in all cases, a result of chronic inflammation of the mucous membrane.

My own conviction, based on personal clinical experience, is that the etiology cannot be confined to any one cause. In the large majority of cases that I have seen, where the polypi were large and numerous, there was no sinous disease. On the other hand, cases of antral disease that I have attended were usually affected also with polypi of the adjoining middle turbinated; but these polypi were always small, and after the healing of the sinus the polypi ceased to return. Hence they were purely secondary results, quite different from multiple myomatous disease.

Nasal polypi are said to occur more frequently among males than females. They rarely occur in early life, although one of the most severe cases I ever saw occurred in a little girl aged 7 years, from whom I removed about twenty from the two nostrils; Fig. 63 gives a microscopical section. Her mother stated that she had been troubled with them from the age of two and a half years; and that for more than a year after that she was under the constant care of a specialist, who removed them as rapidly as they appeared. This case, I think, was undoubtedly congenital. The rarity of these cases is evident from Moure's statistics, for, out of 10,520 cases of nasal polypi, only 5 occurred among children. This is strikingly brought out by Dunbar Roy in an able article reporting a case.

Symptomatology. Two noted authors give directly opposite statements as to first symptoms. Bosworth says: "The first and earliest symptom is tense irritation in the upper air-passages of the cavity, manifesting itself in more or less violent attacks of sneezing,

accompanied with watery discharge." Lænnæx Browne says: "Sneezing is seldom exhibited, immunity from this disagreeable symptom being doubtless due to a blunting of the sensibility of the nerve-endings."

I think the fact is that we so rarely see cases of nasal polypi when they commence to form that we cannot tell whether they are accompanied by sneezing or not. When the patient first presents himself for treatment, it is usually for the relief of unilateral catarrh, associated with more or less nasal stenosis and frontal compression. In some instances we are astonished at the small amount of apparent

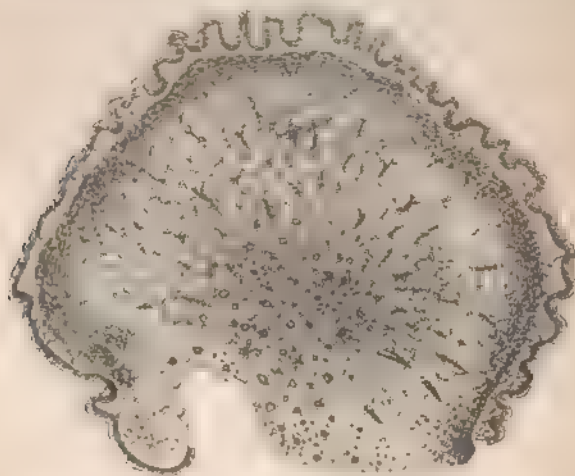


Fig 63.—Microscopical section of nasal polypus from a child 7 years old
(Author's specimen by Bensley.)

distress which large masses of polypi will produce. The reason of this is obvious: they always form in the middle turbinated region and by their presence and pressure expand the upper portions of the nasal fossæ. By this means the lower turbinal region is also expanded, giving compensatory space; and it is not until they are large enough to drop downward that breathing is interfered with.

The sense of smell is likewise seriously affected in the majority of cases.

Not infrequently nasal polypi give rise to reflex disturbances. This is particularly the case with hay fever and asthma; and the truth of the statement is proved by the history of numerous cases

in which these affections have been relieved by the removal of the offending cause. Aprosexia, or lack of power of concentration, is also sometimes a result.

The ocular and aural disturbances induced by the pressure of nasal polypi are not so much of a reflex character as owing to direct pressure upon contiguous structures in the case of the eye and interference with the normal condition of the Eustachian tube in that of the ear.

Diagnosis.—This can only be made by direct inspection; and, no matter how easily seen the growth may be, it is better to make a thorough examination by reflected light. To the experienced observer scarcely anything else can be mistaken for polypus. To the inexperienced it is widely different. Sometimes the polyp. are deeply seated and may be hidden by a deformed septum, or the inferior turbinated may be so enlarged as to hide them from view. The application of a solution of cocaine will, in a few minutes, remove these difficulties and facilitate examination. The bluish-gray color and shining surfaces of the polypi should easily be recognized. Then by using the probe they can readily be moved and their surfaces indented. When the polypi extend backward into the posterior choanae, they can always be examined by aid of the post-rhinal mirror. Here, on account of the color of the two being nearly the same, hypertrophy of the posterior end of the inferior turbinated might be mistaken for polypus: the corrugated surface of the former, however, as compared with the smooth shining surfaces of the latter, should make the diagnosis certain.

Prognosis.—Nasal polypi involve but little danger to life. They produce, however, a great deal of physical distress, while they exhibit little, if any, tendency toward spontaneous arrest of development. While a catarrhal condition of the mucous membranes is produced by their presence, the most serious results that may be expected are the development of hay fever and asthma by reflex nervous action. To these might be added destruction of the sense of smell, and, also, what is more serious, impairment of hearing caused by pressure of the post-pharyngeal polypi on the Eustachian tubes.

The longer the disease is neglected, the larger, the more numerous, and the more prolific do the growths become. It is also a disease which has a strong tendency to return. Let the polypi be removed as perfectly as seems possible, and in many instances a few months will suffice to have a new crop appear, like young grapes in an old

vineyard. The only wise plan is to keep these cases under constant observation, and by careful operative treatment to remove the polyps as fast as they form. In this way many cures in the end can be accomplished.

Treatment.—Complete removal of the neoplasms is the only proper treatment, whether accomplished by ablation or destruction, or both. Formerly the application of astringents in the form of powders and sprays to the surfaces of the polyp was largely practiced, but, being practically useless, it has been abandoned.

Removal by cold snare or forceps, and to destroy them by galvanocautery or electrolysis are the methods now in use. Of these the cold snare has in every way the preference. It is more widely used than any other instrument, and it produces the best and most lasting results; it is indorsed by such men as Moure, Lennox Browne, Bosworth, Shurly, Delavan, Schech, MacKenzie, and a host of others (Figs. 33, 34, 35, 36).



Fig. 64 Blake's ear polypus snare

Jarvis was the first to introduce ablation by this instrument. Since then the steel-wire snare has undergone many modifications, and at the present time there are many varieties in the market.

The simpler the instrument is, the shorter its shaft and handle, and the more easily it can be manipulated, the better. The chief points in selection are to have the instrument light and strong; with the handle placed at an angle with the shaft, so as not to obscure the vision of the parts while operating; and to have it so hung that in the large majority of cases it can be manipulated for the removal of the polypus entirely by the one hand.

Personally I have in my armamentarium a number of expensive instruments highly recommended. They are handsome, highly polished, and indicative of scientific knowledge and skill on the part of their inventors. But I rarely use them. I have tried them over and over again on different occasions; but they are all so cumbersome and unsatisfactory that they lie in the case, simply to be looked at:

and I do all my work now with two or three ear-polypus snares of almost the same pattern. I find them quite capable of grasping and removing the largest nasal polypus even when filling the posterior choana. They are almost identical in form and size with Blake's ear polypus snare (Fig. 64).

In operating cocaine should always be used, not only to anesthetize the parts fully, but also to shrink the tissues and render the vision of the fossa as perfect as possible. It is best to throw in a 4-per-cent. solution first, and then apply a 10- or 15-per-cent. solution by means of a cotton-holder.

In adjusting the snare care should be taken not to have the loop much larger than the circumference of the polyp to be inclosed. Then, as the attachment is always on the external, and not in the septal, side, the lower rim of the loop should be outward as it is passed into the nasal cavity and slipped under the lower margin of the polypus. By a gentle back-and-forward movement and gradual tightening of the loop, it can usually be slipped up to the neck of the polypus; then the wire is drawn home and by traction the body removed.

This is only a general rule of operation, and must be modified in detail according to the number and positions of the different polypi and the experience of the operator. After cleansing the fossa of discharges that may occur, the routine may be repeated over and over again at the one sitting, until all that are visible are removed, or until it seems advisable to postpone the conclusion of the work. As a rule, the hæmorrhage is slight, but occasionally it may be more severe; and in some cases tampons might require to be inserted to hasten its control. I have never, however, seen a case where this was necessary.

How thoroughly the removal of the visible polypi from one or both nostrils at the one sitting may be accomplished depends a good deal on the ability of the patient to stand the combined effects of the cocaine and the operative treatment. In any case I believe it is better to have the patient return at intervals of two or three days regularly until all the polypi are extracted. I have frequently seen cases where I have taken away all that I could see on the one day, and on the reappearance of the patient, forty-eight hours later, another series were visible in the lower part of the middle meatus. These were not of new formation; but had merely availed themselves of the open space produced by the previous evulsion and by gravitation and press-

ure from above had made themselves visible. Some authorities advise to wait a week before operating the second time. Why should this be done? The patient often comes fifty or one hundred miles to be relieved of his nasal trouble. Time is precious to him; and it would seem to be our duty to relieve him as thoroughly as possible during the limited period at his disposal; and we may be able to do this by operating on alternate days until the work be accomplished, provided that the reaction from each operation has subsided before the next one is done. During the intervals between operations I have found my patients rendered much more comfortable by the repeated use of a spray of simple albolene.

When the nostrils are pretty thoroughly cleansed of polypi, it is advisable to again apply cocaine; and, upon drying the parts, little fragments and stumps of polypi may still be visible. These should be touched with the galvanocautery; and it can be done with but slight injury to the surrounding mucosa. The healing is rapid and attended by little or no discomfort.

Bosworth says that: "If we thoroughly extirpate the growths they do not recur." This is contrary to my own experience and to that of a large number of rhinologists. Some operators are more skillful and more successful than others; but, as a rule, you may remove every vestige of polypus that can be found, you may ablate completely and watch the case for weeks or months without the slightest apparent return, but let two or three years pass by, particularly in young people, without any treatment, and in a large number of cases, upon examination, you will find a reformation of the growths. This may not be on account of incomplete extirpation; but from the fact that, although you can eradicate the disease, you may not be able to eradicate the innate tendency to its development.

Casselberry strongly favors removal of the anterior end of the middle turbinate by scissors, forceps, and curette, when the polypi form, as they frequently do, directly around the hiatus semilunaris. This gives much greater freedom of access to the bases of the polypi, and permits of more thorough eradication.

I do not mean to say that this disease cannot be cured, for I believe it can; but that, to thoroughly destroy the tendency, each case should be seen often enough to nip the buds as they form, and by this means eventually to break up the habit.

The difficulty is that patients experience such complete and gratifying relief after thorough operative treatment that they do not

take cognizance of the slow return, and frequently put off the visit to the surgeon until a large number of polypi have again developed.

The second method of treatment, that of evulsion by forceps, is the oldest method of operative procedure, and is still largely practiced. Many forms of this instrument have been devised. The blades should be narrow and strong, as well as serrated, or toothed, and set at a similar angle to the nasal saw and polypus-snare and for the same reasons. Seiler's tube-forceps are also said to serve a good purpose.

The chief objection to the forceps operation is the injury so likely to be inflicted upon the mucous membrane by its use: a consideration so largely absent in the careful use of the snare. If the surgeon decides to operate with the forceps, it becomes his imperative duty to exercise the greatest care in order to produce a minimum of injury.

In operating, after cocaineization, aided by speculum and mirror, the forceps should be closed and gently inserted until the neck of the polypus is reached and carefully seized. Then by a twisting rotary motion it is detached and withdrawn. The operation is to be repeated until all the polypi are removed. There is more tearing in this operation than with the snare and consequently more bleeding. So that, as a rule, a smaller number can be removed at one sitting.

The galvanocautery-snare had numerous advocates among the earlier writers for the effectual removal of nasal polypi, Voltolini, Michel, Bruns, and others being earnest advocates of the method. Later writers, however, do not approve of it, the chief objection being the difficulty of adjusting the soft and pliable platinum wire to the neck of the polypus. In place of it the elastic spring of the cold-steel wire has found almost universal favor.

One other method of treatment must be mentioned which has been received with some favor by several recent writers; this is treatment by electrolysis. Two methods of application are advocated: one is to attach the positive pole of the battery to a needle to be inserted into the polypus, while the negative pole with sponge electrode is placed over the nose; the other is to pass both needles into the polypus side by side. The current in each case should be continued for ten or fifteen minutes at each sitting. The process is a very tedious one, and for this disease of doubtful utility.

CHAPTER XIX.

PAPILLOMA.

AS ALREADY stated in the preceding chapter, the pathological difference in the construction of nasal polypus and nasal papilloma is very slight. The elementary tissues are the same in each, the difference, according to McBride, being dependent very much upon density of construction and site of attachment, their microscopical characters being very much alike. The papilloma is the result of proliferation of epithelial and connective-tissue elements. When found near the entrance of the nostril, the growth is firm and dense in structure and covered with squamous epithelial cells. When deeper within the cavity, the covering is of columnar cells and the papilloma is of softer texture (Hopmann).

The usual site is the anterior portion of the nostril, either upon the inferior turbinated, the septum, or the floor of the nose. They are supposed to be caused by irritation of one form or another. Still, as they resemble cutaneous warts in method of growth, as well as structure, it is difficult to trace the etiology.

They are not of frequent occurrence, although much has been written about them. Their growth is slow and painless, and frequently the only knowledge the patient has of their existence is from digital examination. The annoyance which the discovery has produced may induce the patient to have them removed. Sometimes, like their congeners, warts on the hands or face, they may appear in numbers; and produce a certain amount of stenosis, with local irritation and muco-purulent discharge.

In regard to prognosis, operation is said to have been followed by death in two cases. In Ward's case the patient died of pneumonia twelve days later, though what connection existed between the two phenomena we are left to conjecture. In Verneuil's case death seemed to have resulted from an extension of the tumor. With these exceptions, the results of operative treatment have apparently always been successful.

Treatment.—This is simply removal of the growth, either by

snare, scissors, or knife. The main object is to remove the neoplasm in its entirety and with as little irritation to the surrounding mucosa as possible. In the majority of instances this can be accomplished by means of the cold-wire snare. As a rule, no after-treatment is required. If, after ablation, any prominent tissue is left or the removal is incomplete, the base should be touched with the galvanocautery. When near the margin of the nostril, it would be well to apply vaselin occasionally for a day or two to allay irritation.

In my own practice I have seen but one case. This occurred in a lady aged 35 years. It was located on the floor of the right inferior meatus, and would occasionally bleed. It was clipped off with scissors and without using cocaine, and healed without further treatment.

In the majority of cases it would be better to use a local anæsthetic before operating.

BILATERAL TUMORS OF THE SEPTUM.

Pegler (*Journal of Laryngology, Rhinology, and Otolaryngology*, October, 1898) divides these growths into two varieties: the lymphoid and the erectile. Their chief interest lies in their etiological relationship to nasal obstruction, paresis of the soft palate, and stigmatic dysphasia, or affections of speech.

Of the lymphoid variety the author reports one case. This consisted of a growth on each side of the septum, about three millimetres from the posterior border. The tumors were attached by a broad, tough pedicle, and projected into the naso-pharynx. They were oval in shape, pale in color, and mammillated on the surface. Microscopically they consisted solely of lymphoid tissue, incapsuled by ciliated epithelium. There were no adenoids, but large hypertrophies of the middle and inferior turbinates were present.

The erectile variety appeared as parallel longitudinal ridges, extending along the septum from before backward at the level of the tubercle. They, too, are broad-based, pink in color, and sometimes lobulated. Microscopically they are composed of erectile tissue, mingled with masses of lymphoid cells.

The treatment of the lymphoid tumors was removal by cold snare and spokeshave, aided by the finger in the naso-pharynx. The erectile growths were excised by means of a curved, probe-pointed tonsil-knife, the snare being used to engage what had escaped abscission.

CHAPTER XX.

FIBROMA.

THE majority of cases of fibroma affecting the air-passages are to be found in the naso-pharynx. Still, an examination of the literature upon the subject will prove that it sometimes does occur within the nasal cavities, and the reports of something like fifty cases have been published.

Pathology.—Fibroma, wherever found, presents the same essential pathological features. Its chief constituents consist of close-grained fibrous tissue, with stellate cells scattered between the bundles. The fibrous tissue is chiefly white, with yellow, elastic fibres interlacing through it. Bilbroth has shown that the starting-point of development is in the nerve-sheaths and walls of the small arteries. As the growth develops, the nerves shrink away, while the arteries become enlarged. This will account for the comparative insensibility of nasal fibroma, together with its tendency to repeated hæmorrhages. Sometimes myxofibroma appears from the first, and the excessive arterial supply may, in others, lead to formation of angiofibroma.

Etiology.—The rich supply of nerves and blood-vessels within the nose may have a causative relation in the etiology of this disease, particularly as it is in the nerve-sheaths and adventitia of the arteries that it makes its first manifestation. Traumatism is, in some cases, the exciting cause. It occurs more frequently among males than females, and it is most prevalent during the earlier years of life,—say, between the ages of 15 and 40 years,—though no period of life is exempt. In Jobson Horne's case the patient was a woman aged 70 years, while Sikkel's case was congenital, being present at the birth of the child.

Symptomatology.—The chief symptoms are gradually-increasing stenosis of one nasal fossa, attended by frequent hæmorrhages, and occurring during the earlier years of life. The closure of the nasal cavity increases as a result of the growth of the neoplasm. The attacks of bleeding are sometimes very frequent as well as persistent. The slightest touch upon the tumor may give rise to it.

Other symptoms, the result of pressure, are observed as the dis-

ease advances. Such as anosmia, from compression of the olfactory nerve-filaments; deafness, from closure of the Eustachian tube; or epiphora, from pressure upon the lacrymal duct. Facial and palatal deformity are also frequently present from the same cause.

Diagnosis.—Examination with the nasal speculum should reveal the front surface of the tumor. Application of cocaine will shrink the surrounding tissues, and after removal of secretions by the cotton-holder a good vision should be obtained. The color should be a pale-reddish pink, some parts brighter in color and ready to burst with the contained blood. When in a state of quiescence and unirritated, the white, fibrous tissue may, in some cases, be seen beneath the glistening surface. The growth is usually smooth, lobulated, and irregular in form, its limits well defined, and its attachment sessile. The body of the growth is firm and not easily moved, though touching by the probe may not infrequently produce hæmorrhage. The posterior side of the tumor can usually be examined by aid of the rhinoscopic mirror, when displacement of the normal tissues may be observed, as a result of the enlargement of the neoplasm.

The relentless growth of fibroma is one of its characteristics, and in this it resembles sarcoma. The more irregular contour, with the presence of greater pain and a larger amount of surface-sloughing, should distinguish the latter; but it will require microscopical examination to complete the diagnosis.

Prognosis.—Without successful operation the result will always be unfavorable. The steady advancement of the growth upon all the surrounding tissues, muscles, cartilages, and bones, and its nearness to the vital points,—arteries, nerves, and brain,—render a fatal result inevitable.

With operative treatment many cases have permanently recovered; and when the fibroma can be entirely removed the prognosis is hopeful. The operation itself, however, is not without danger. A number of cases are recorded in which death was directly the result, and in most of them from the hæmorrhage itself, at the time of the operation.

Treatment.—Local treatment by way of sprays and powders is useless in this disease. Electrolysis, however, as reported of one case by Ingals and another by the writer, has been used with advantage in reducing the size of the growth and in facilitating more radical measures. Whether or not it can be made available for complete removal remains to be seen.

When the tumor can be embraced by a cold-wire snare or the galvanocautery *écraseur* (Fig. 37), there are no better means of operating at our disposal. Of the two, as in the case of nasal polypi, the steel wire is more readily adjusted than the pliable platinum, and in the use of the one or the other each case must be judged upon its merits. The slow compression of the steel wire will probably do more for the prevention of hemorrhage than the more rapid adjustment of the cautery-snare, although the latter might have a better effect in destroying the base of the tumor.

Owing to the broad, sessile base which so often occurs, Casselberry's device, of notching the base of the fibroma at each side by the galvanocautery-knife (Fig. 38), and then adjusting the steel snare into the notches and round the growth, may suit some of these cases.

In some cases the neoplasms have been so large and difficult to reach that the surgeon has resorted to direct dissection by operating upon the nose or through the palate in order to reach the seat of the disease.

Still, in all cases, no matter how operated on, the great danger of hemorrhage at the time has to be met. In Gerdy's case and in Seiler's both died on the table from this cause.

In a case the history of which I read before the laryngological section of the American Medical Association at Baltimore, in 1895, the patient almost bled to death in my office at the commencement of operation from galvanocautery incision into the growth. The man, aged 22, had been treated by a surgeon for a bleeding growth in his nose five years previously. Several attempts were made at that time to remove it, but each time there was excessive hemorrhage, followed by rapid growth of the tumor. A section was removed for microscopical examination and it was pronounced sarcoma. Subsequently he went to a hospital in one of the Atlantic cities to have it removed. This would appear to have been successfully accomplished, for it did not recur again until about a year before he came to me for treatment.

On examination I found the posterior half of the right nasal fossa filled with a grayish red growth. In front of it was a wide cavity with complete absence of inferior turbinated bone—probably removed at the former operation. The attachment was widely sessile, extending over the upper part of septum, vault above and middle turbinated. Posteriorly it pressed the palate downward, the septum to the left, and the Eustachian tube backward.

As it was impossible to snare it, owing to its wide attachment, I concluded to try successive operations with the galvanocautery. The first operation was at the lower septal attachment, incising upward. There was little bleeding. Two days later the operation was repeated at the outer margin. This time the bleeding was severe, and I inserted kite-tailed tampons to control

it. One week later I incised the central portion between the two former cuts. In a few seconds, while the instrument was still in position, arterial blood commenced to jet vigorously from the nose; kite-tailed tampons were resorted to again, without avail. Dr Reeve kindly came to my assistance and we plugged the nostril from behind with Bellocq's cannula (Fig. 55). The patient was in a collapsed condition, and was confined to bed for several days, at the end of which time I removed the plugs and commenced the use of bipolar electrolysis. The needles were inserted a quarter of an inch apart through the anterior naris into the growth. This was repeated at several sittings, producing pallor of the growth and slight shrinkage. Then the current was changed, one straight needle being inserted through the anterior naris into the growth and a curved needle passed behind the palate and into the tumor from behind. The *seance* in each case was from three to five minutes, all the patient could endure, although 20-per-cent. solution of cocaine had been applied.

I then returned to the use of the galvanocautery-knife, and little by little destroyed the whole of the growth without further accident. There were sixteen operations in all, covering a period of two months. One-half the operations were through the anterior naris; the other half, though performed through the anterior naris, were guided by light reflected from the post-rhinal mirror.

Twice over microscopical sections were made, and they proved the growth to be a close-grained fibroma.

This is now four years after the operation, and there has been no return.

It is but rarely that fibroma of the nose is quite pure in its formation. Frequently there is a combination with myxoma, sarcoma, or angioma, or else the so-called soft fibroma of Stoker or Victor Lange, composed of vascular papillary growths of the middle and inferior turbinates.

Probably one of the most characteristic cases of pure fibroma that has occurred was the one reported by Charles Knight. It was composed of dense fibrous tissue, with collections of small, round cells of inflammatory origin near certain points of its surface, and it was noted by its absence of vascularity. It was pedunculated and its removal easily accomplished by cold-wire snare. There was no recurrence.

CHAPTER XXI.

ADENOMA; ANGIOMA.

ADENOMA.

ADENOMA of the nasal passages is so exceedingly rare that anything more than an allusion to it will not be necessary here. The name indicates that it is a growth of glandular character; and, as the glands within the nasal cavity are few in number and only limited in action, it can readily be seen that tumors of a glandular nature in this region must of a necessity be infrequent.

Still, that they do occur is verified by several instances that have been recorded; and as one reported by Gosselin gives the history, pathology, and treatment of the case, I will repeat it as described by him:—

“A man, aged 43, presented with the following history: Early in 1857 he developed nasal stenosis, for which he sought relief at the hospital, early in the April following, when a number of polypi were removed. A second operation of the same character was done in October. In February, 1858, he was seen by Gosselin, who found the right nasal passage completely closed by a tumor which presented at the nostril and also projected into the pharynx. It was of firm consistency and grayish in color, the surface being soft and pul-taceous. It was attached in front and above. An operation being decided upon, access to the cavity was obtained by external incision, and the growth extracted by means of forceps and manipulation. The operation was attended by but slight hæmorrhage. Microscopical examination showed the growth to be composed of ‘abundant epithelial cells with glandular *cul-de-sacs*,’ on which the diagnosis of a glandular tumor was based. The operation was successful and the patient left the hospital apparently cured.”

ANGIOMA.

When we consider the exceedingly vascular nature of the nasal mucosa, we would naturally be of the opinion that it would be prone to the development of angiomatous tumors. Still, very few cases have

been recorded, probably not more than 20 in all. Among the most recent is the one reported to the Laryngological Society of London in March, 1896, by St. Clair Thomson. It was removed from the right middle meatus of a man aged 29. The growth was the size of a hazel-nut, irregularly ovoid, and lobulated. It was attached by a bluish pedicle to the right cartilaginous septum and removed by snare. There was free hemorrhage, checked by the galvanocautery. Recurrence took place. This was also removed. Microscopical sections were made, proving the tumor to be an angioma.

Pathologically these sections were almost completely surrounded by normal columnar epithelium. In some parts immediately beneath the epithelium there was loose connective and myxomatous tissue; while in other parts the epithelium lay directly on the new growth. This was composed almost entirely of blood-vessels of very different sizes whose walls were formed of cells, and did not contain either elastic or muscular tissue. The stroma between the vessels consisted of loose fibrous tissue, with oval and spindle cells, which were of uniform character throughout, and arranged around the vessels, among which was a good deal of extravasated blood.

This account of the histological conditions of Thomson's case does not differ materially from the pathology of the disease described by Bosworth years ago.

The etiology is doubtful, it being difficult to assign a definite cause, either active or predisposing. Bosworth suggests that it may arise from disturbed nutrition of the vascular walls. It occurs during all ages of life.

The symptoms are similar to those attending nasal fibroma, except that the softer character of the growth will prevent nasal deformity by pressure. Angioma differs also from fibroma in not being dangerous to life and in being more readily amenable to treatment.

Treatment.—About the only treatment recommended is removal either by the steel wire or galvanocautery-snare. The former is considered the best, as by slowly tightening the wire hemorrhage may be avoided. Jarvis's snare, with its nut-screw, is believed to be the best adapted to the treatment of these cases, placing the wire as high as possible upon the pedicle.

CHAPTER XXII.

CYSTOMA OF THE NOSE.

DEHAVAN reported in 1895 three cases of this somewhat rare affection. They were all cases which had been for years affected with nasal polypi and in which, after repeated operations for their removal, cystoma had eventually developed. In one case the growth hang out of the nasal fossa into the post-pharyngeal space. It was round, and about an inch in diameter, and was removed by Jarvis's snare. In the other two cases all efforts to remove them were unavailing until the growths had been punctured. Then a large amount of fluid drained away and, the walls collapsing, they were removed by snare or polypus-forceps. Microscopical examination of the remnants, made in each case by Dr. Hodenpyl, proved them to be composed of columnar and ciliated epithelium, glandular matter, fibrin, and cell *détritus*, diagnosing each case as loose fibroma. The fact that each of them contained ciliated epithelium would prove their origin from the middle or lower turbinateds.

The cases of Johnson, Watson, and Lefferts, as reported by Bosworth, were also of middle-turbinal origin (Fig. 61).

Brown Kelly (*Journal of Laryngology, Rhinology, and Otology*, June, 1898) gives a report of an entirely different series of cases of cystoma of the nose. The situation of development is the floor of the fossa; and as no full account has heretofore been published, together with the history of his cases, he gives a sketch of the disease.

It always occurs in females. At any rate, the twelve cases, up to the present time reported, have all appeared in women, the ages being between nineteen and fifty eight years. The site of formation, likewise, is always the same, being the outer floor of the nostril, anterior to the inferior turbinated body, and just behind the union of the skin with the nasal mucous membrane. The appearances within the nose vary only in degree. When the cyst is small, it forms a grayish hemispherical eminence, about the middle or outer half of the floor. As the sac enlarges, it extends backward, and also downward into the incisor fossa, but very rarely toward the septum.

The views as to etiology are largely speculative, but it has usually been considered as the development of a retention-cyst, probably the result of inflammatory action.

As to treatment, when the cyst is small, incision or aspiration, with or without the injection of an irritant, will suffice. If the discharge continues, the application of caustics or the destruction of the lining membrane of the cavity by galvanocautery may be called for. When the cyst becomes large, its excision from the gingivo-labial fold would be required to produce a cure. In two of the cases reported by Brown Kelly simple incision was all that was needed. In the third incision was followed by return, and the cyst was eventually excised.

CHAPTER XXIII.

CHONDROMA; OSTEOMA.

CHONDROMA.

MOST of the cases of cartilaginous enlargement within the nose that come under observation are merely hypertrophies of the cartilaginous septum, and cannot be placed under this head. The term "chondroma" is confined to those cases of round nodulated tumor occasionally met with which macroscopically resemble fibroma, but which on closer examination are found to consist of cartilage. They are usually found at the anterior, inferior angle of the cartilaginous septum.

The etiology of these growths is still unknown. The period of their development is during the adolescent years of life. The symptoms are similar to those produced by benign neoplasms. They differ, however, from fibroma and angioma by being unattended by hæmorrhage and by their yellowish color. To touch they are hard and cartilaginous, but the pressure of a needle will distinguish them from the still greater hardness of osteoma. In structure they are composed of hyaline cartilage, combined with white fibrous and yellow elastic tissue.

Simple surgical treatment is required, the object being removal of the growth. Whether this is done by snare, scissors, curette, gouge, or knife is immaterial, so long as the tumor is completely excised. There appears after successful operation to be no tendency to return.

OSTEOMA

Osteoma requires to be distinguished from exostosis, as the latter term applies to bony outgrowths of the septum, at the sutural junction of the vomer with the perpendicular plate of the ethmoid, or the palate, or maxillary bones, while the former is restricted to osseous neoplasms, having their origin independent of sutural union. They are usually located in the upper portion of the nose, having their origin in the bones of one or other of the accessory sinuses.

Pathology.—In some cases the osteoma is made up entirely of hard, compact tissue. In others the body of the bone is cancellous and covered with a close and compact layer. In Adenot's case the tumor was an osteogenic exostosis, with a chondromatous envelope. In Coakley's it was exceedingly hard, springing from the inferior turbinated, and of tertiary syphilitic formation.

Etiology.—The etiology is unknown. Possibly it may arise from some constitutional dyscrasia. The period of its greatest frequency is early life. The majority of cases are said to occur in males.

Symptomatology.—External deformity is one of the earliest symptoms. This is owing to the situation of the growth, being in the upper part of the nose. Hence, stenosis, one of the earliest symptoms produced by the majority of benign nasal neoplasms, may be late in appearing. Pain is likely to occur, owing to pressure upon the nerve-filaments. In Adenot's case, epileptic seizures, produced by reflex action of tumor, were relieved, after vertical osteotomy had been performed. Epistaxis and nasal discharge are neither of them likely to be troublesome. The point of origin is frequently in the neighborhood of the ethmoid cells, and may be from little islands of cartilage or bone in the mucous membrane.

Osteomata are usually irregularly lobulated and covered with mucous membrane. When the growth has space enough to develop itself without infringing upon surrounding bony structures, it will remain free and rounded. It is when its development becomes impeded by osseous resistance that it becomes lobulated or flattened. If from any cause its attachment becomes fractured, it may remain within the nasal cavity as a foreign body.

Treatment.—Osteomata differ from other nasal neoplasms in the fact that they usually require external operations to accomplish their removal. This is owing to the density and size of the growth and the difficulty in reaching the site of attachment. The surgical operation required to reach the growth is sometimes more difficult than the excision itself. This must be conducted upon ordinary surgical principles. When the tumor is reached, the chisel, saw, or forceps, may readily separate the neck from its attachment. Hæmorrhage, which is sometimes severe, requires to be guarded against.

CHAPTER XXIV.

SARCOMA.

FORTUNATELY this malignant disease rarely occurs within the nasal fossa. Although the majority of cases occur in mature life, the average age of patients afflicted with it is less than in carcinoma, while the younger the patient, the greater the malignancy and the quicker the fatal result. The usual site is the septum, but it may arise from the turbinateds or any other portion of the nasal cavity.

Pathology.—The pathological history of sarcoma of the nose does not differ from that of other regions of the body. It originates from the meshes of connective tissue and is filled with round, ovoid, and fusiform cells, the round often prevailing. Myeloid and large granular cells are often present in large numbers. When the granular structures of the mucous membrane have undergone proliferation in connection with the development of round- or spindle- celled elements, adenosarcoma may result. In other instances, proliferation of the stellate mucous cells, together with the sarcomatous elements, would indicate myxosarcoma; while in cases where the ordinary blood-vessels are lost, and vascular spaces are found instead, in connection with the sarcomatous development, angiosarcoma is the result.

Etiology.—The history of the forty-one cases collected by Bosworth, and another dozen that have been recorded since then, throw little light upon the subject. Some were preceded by nasal polypi, which might bear a causative relation to the development of the malignant disease; but a very large number arose *de novo*, and without assignable cause. Some writers believe that surgical traumatism, in the way of galvanocautery and forceps operations, is, in some instances, a cause. As an objection to this idea, it may be argued that a large number of the severest cases of sarcoma occur in the earlier years of life, when prior nasal operations have not been thought of. Personally I have never seen a case of malignant disease of any kind which could in any way be traced back to operative treatment.

Symptomatology.—The first and most prominent symptom is ob-

(138)

struction to nasal breathing. This is soon followed or accompanied by a foetid mucous discharge. The color is often greenish and hæmorrhage frequently occurs. This odor arises in part from decomposed retained secretions. Pain, although not necessarily severe, is of frequent occurrence and is due to pressure. When located in the anterior region of the nose, there may be great deformity. When in the posterior, deafness and dysphagia may result. When in the upper and middle turbinal region, destruction of the cribriform plate of the ethmoid and extension of the disease to the brain may lead to a fatal issue.

Sarcomata bleed easily when touched with a probe. They have no resiliency, and have a reddish color, frequently assuming a bluish or violet tinge. They occur singly and may be either pedunculated or have a broad or sessile base.

Diagnosis.—The malignancy of the growth can scarcely escape recognition after careful rhinoscopic examination. The soft pulsatious tissues, with reddish-gray surfaces, foul odor, and offensive discharge will, in many instances, at once stamp the nature of the disease. But, when occurring in mature years, nothing but microscopical examination will positively distinguish it from carcinoma.

Prognosis.—It is a hopeless disease save for the relief that may be obtained from operative treatment. When taken early and thoroughly removed by operation, there is a fair prospect of recovery. One-half the cases reported up to the present time are said to have been cured. This statement must be accepted with much reservation, as many of the reports were obtained but a short time after operation and before there could well be a recurrence of the disease.

Treatment.—Complete extirpation when the disease is not too far advanced for operation is the only correct method of treatment. Without there is good prospect of this being accomplished, it should not be attempted at all. With regard to the nature of the operation, each case must be a rule for itself.

When the removal can be made through the anterior nares, without facial operation, it is much the better plan to follow, taking the neoplasm away by snare, curette, spoon, cautery, etc., or all combined, as the case may require, always guarding against the possibility of excessive hæmorrhage. This method can only be available in the very earliest stages of the disease, the parts being anæsthetized by a strong solution of cocaine.

In other instances, however, primary surgical operations through

the nose or soft palate will be required before the base of the growth can be reached. Having eradicated the tumor, the parts are replaced by regular surgical methods and the internal wound treated as the conditions of the parts may require.

CHAPTER XXV.

CARCINOMA.

RARE as is sarcoma within the nasal cavity, still more rare is the more malignant disease carcinoma. The average age of persons afflicted with it is also somewhat greater, although, as in sarcoma, the period of childhood is not entirely exempt. The thirty cases carefully collected by Bosworth were all of primary origin, and the same may be said of the cases of Hinde, Max Thorner, Haton, Dreyfuss, Flatau, Domoe, Syne, Hopkins, and Lennox Browne which have occurred since the issue of Bosworth's work. That is to say, in each of these cases the epithelioma made its appearance first within the nasal cavity.

In all these cases the only elaboration of the carcinoma was by extension, and not by formation of new foci in distant regions. As secondary carcinoma of the nose, I have so far not been able to find a case on record, although extension to the nose from the neighboring organs might possibly occur.

Pathology.—As in sarcoma, the pathology of carcinoma is the same wherever found. When near the cutaneous surface, the cancer may be a squamous epithelioma (Verneuil). Deeper within the cavity the adeno-epithelial type may be developed, as in the case recently reported by Max Thorner. Throughout the growth an enormous mass of tubuli or alveoli will be found surrounded by connective and epithelial tissue and filled with colloid substance.

Etiology.—Hereditary influence is probably the most potent primary cause in the development of cancer. Granting this, we know that physical injury is frequently the exciting cause for its development in other parts of the body. Possibly the reason of its extreme rarity in the nose is the infrequency of severe traumatism in that region. It is a disease which rarely occurs until after middle life. The possibility, however, of the development of malignant disease from either myxoma or fibroma of the nose is now an acknowledged fact.

Symptomatology.—The symptoms are almost identical with those produced by sarcoma of the nasal passages. The submaxillary glands are more likely to be involved, the cachexia to be more

marked, and the progress of the disease more rapid, while the average age of the patient is greater. But the stenosis, the offensive and foul discharges, the deformity, and the internal appearance of the growth are very much alike in both diseases.

Diagnosis.—The diagnosis must depend materially on microscopical examination, the resemblance to sarcoma being so great that the distinctive cancer-cells would need to be discovered to insure a positive opinion. From tuberculosis and syphilis the clinical history should be sufficiently positive to make the diagnosis certain, particularly with microscopical aid.

Prognosis.—The prognosis is the worst that can be expected, except in exceedingly rare cases where the disease has been recognized and promptly removed upon its earliest manifestations. Even in these cases speedy recurrence is more than a possibility.

Treatment. The majority of cases do not come under observation until after the disease has become thoroughly seated and the deep-lying tissues involved. In such cases operation would be useless, and would only induce more rapid development. All that could be done reasonably would be in the way of soothing antiseptic applications, such as cocaine, aristol, iodoform, iodol, etc., together with systemic support.

In early cases, when there is freedom from glandular enlargement and a fair prospect of complete eradication, it would be the duty of the surgeon to extirpate at once, and by the most available means, as already described in dealing with sarcoma, the main features of the operation being to avoid undue injury to surrounding parts, bearing in mind the possible evils of traumatism upon already-weakened tissues. A large number of these cases occur in the ethmoid region, and one can see how hopeless radical operation would be even in the most initiatory stages. In very few instances has operation been successful even in giving temporary relief, while in not a few it has hastened the final issue.

CHAPTER XXVI.

TUBERCULOSIS.

As an indication of the rarity with which tuberculosis attacks the nasal passages, Willigk, out of 426 autopsies upon the bodies of persons who had died of tuberculosis, found only 1 case in which the disease had affected the nose; and Weichselbaum, out of 164 similar autopsies, found only 2. On the other hand, rare as the disease is in this region, Reidel reported 2 cases in which primary tuberculosis of the septum existed for years, without the lungs being in any way affected by the disease; and William Hill in 1896 reported 1 of tuberculosis of the inferior turbinated in which disease of the lung was so slight that he mistook the nasal disease to be malignant, and performed turbinectomy. The patient did well, although subsequent microscopical examination proved it to be a case of tuberculosis. Symonds, Watson, Williams, and Sach have all reported cases of primary septal origin.

Pathology.—The exhaustive investigations of recent pathologists, particularly of such men as St. Clair Thomson and Hewlett, have thrown new light upon the subject of nasal pathology. These gentlemen proved that about 500 litres of air, containing, on the average, 1500 bacteria, are inspired every hour by each person. Thirteen healthy individuals were examined. As the vestibule of the nose contains vibrissæ and is lined by membrane, partly integumentary and partly mucous, they made one series of cultures and cover-glass preparations from the vestibule and another series taken from the mucous membrane deeper within the fossa. The result was that, while in the first series they found a large number of micro-organisms, in the second they found very few, 80 per cent. of them being sterile, having no micro-organisms at all. The natural conclusion is that the comparative immunity of the nose from such diseases as tuberculosis, cancer, sarcoma, syphilis, etc., is due in some measure to the bactericidal properties possessed by the phagocytes of the nasal mucosa.

There are two forms in which tuberculosis of the mucous membrane of the nose may present themselves. In the one ulceration

may take place, either on the septum or on the floor of the inferior meatus. In the other, hyperplasia, with a sessile base, may appear upon the septum, the inferior turbinated, or the outer wall. Ulceration follows, surrounded by pale granulations. There is usually more or less round-celled infiltration, together with nucleated epithelial cells. Tubercle bacilli are frequently few in number.

Etiology.—The disease usually occurs as a secondary deposit, following pulmonary tuberculosis. In some cases the method of attack is said to be by autoinfection, from contact of the sputum during coughing with an excoriated septum. In others it occurs through the lymphatics. One case is reported by Chiari to have been caused by infection from the antrum of Highmore. In some cases the germs must have come from without, dust, laden with bacilli, being deposited upon abraded mucous membrane near the anterior nares.

Symptomatology.—When hyperplasia has taken place, it is of a grayish-red color, soft and protruding, bleeding easily, and of irregular outline. It is often covered with mucus or crusts, with a tendency to ulceration. When ulceration takes place, crust-formation is likely to be troublesome. Stenosis is often present, but there is no pain. The usual discharge is that of grayish mucus, the amount depending on the severity of the ulceration.

Diagnosis.—Tuberculous ulcers wherever found always present similar appearances. The color is usually whitish gray. There is little loss of tissue, the centre being only slightly depressed. The border is irregular in outline. There is never any areola round the ulcer, and the bluish-red tinge gradually blends imperceptibly with the surrounding mucosa. The irregular crusting and bleeding of the nose are produced by the drying and irritating effects of respiration. The neoplastic form of tubercular disease, usually found in the inferior turbinated, presents an appearance of little, grayish-red warts, and must be distinguished from papilloma by being smaller, flatter, and softer. Microscopical examination will usually discover tubercle bacilli, though in small numbers.

Prognosis.—In a large majority of cases this is purely a secondary matter, depending upon the progress of the primary pulmonary lesion. It is usually slow of development, and may continue for years without serious results, the comparative fatality of pulmonary, laryngeal, and pharyngeal tuberculosis not applying to the protected chambers of the nose. The local lesion can frequently be readily removed, but is apt to return.

Treatment.—When neoplasms and granulations have formed, free operation by curetting and cauterization is advisable. For ulceration, applications of lactic acid in 25- or 50-per-cent. solutions are useful, as also are chromic acid, sulphuricinate of phenol, formalin, and trichloroacetic acid after previous cocaineization.

Supporting measures are also required. The aim should be to supply as large an amount of nutriment to the system as the digestive forces would have power to assimilate. Of medicines, codliver-oil, iron, and strychnine are all useful. But perhaps, of all, carbonate of creasote is the best for its systemic and antiscorbutic effects. It contains 90 per cent. of creasote and, being almost inodorous and non-irritant, can be readily taken. It is said not to be decomposed until it reaches the duodenum, where it gradually splits up and is absorbed. The dose is 1 to 2 grammes two or three times a day. It can be taken readily in sugar or in codliver-oil, in doses of 10 or 15 grammes of the latter.

CHAPTER XXVII.

LUPUS; GLANDERS.

LUPUS.

SOMETIMES, though rarely, lupus may occur primarily within the nasal fossa; but usually the external nose or the palate is affected first, and the disease extends backward or forward into the nasal cavity.

Pathology.—The essential pathological change in this disease is the deposit of round cells of granulation-tissue in the meshes of the mucous membrane. This deposit, or infiltration, is gathered in little masses or nodules, and seems to follow, in a measure, the course of the blood-vessels. In addition to the characteristic round corpuscles of lupus giant corpuscles also occur. As the nodules rise above the surface they ulcerate; but the nodular reproduction beneath is more rapid than the surface-desquamation; consequently, unless the disease is checked by medical or surgical treatment, the proliferation of the neoplasm is in excess, and the nasal passages become blocked by the development of the disease. Schuller has found irregular chains of micrococci among the granular cells and extending into the surrounding connective tissue. Neisse was the first to demonstrate the presence of tubercle bacilli; and, as more recent investigations have frequently discovered their presence, the theory that lupus is a species of tuberculosis has been established.

Etiology.—There is no doubt that the disease arises from the deposit of a specific virus which produces changes of an inflammatory and ulcerative character in the membrane affected, and that a strumous diathesis is a prominent factor in preparing the soil for the germ. The majority of cases occur in the early years of maturity, but quite a number even in youth. One is reported at the age of six months, while Reed, Shurly, and Tresilian record cases at the fourteenth year. Most nasal cases attack the cutaneous surface first, and the mucous membrane afterward.

Symptomatology.—A certain amount of nasal stenosis is always present. After ulceration brownish or greenish-brown crusts form, accompanied by sanious discharges from beneath their edges. On

lifting the crusts, blood will exude from the central parts of the nodules. Odor is not marked, but, when it does not occur from retention of the scabs, it is of a musty character. Pain is not a prominent symptom, nor is the physical system materially affected.

Diagnosis.—The peculiar reddish, nodulated appearance of the external nose, with the greenish-brown crusts and characteristic discharge, should remove all difficulty in diagnosis when the external organ is affected. Any intranasal lesion will only be an extension of the external disease, the cartilages usually succumbing to its onward march. When, however, the mucosa is the only part affected, considerable difficulty may attend the diagnosis, and the truth may only be reached by a process of exclusion. One point should be remembered, however, and that is the peculiar softness of the lupoid growth. It can be easily removed by the spoon and indented or penetrated by the probe.

From syphilis it can be distinguished by constitutional treatment, and from tuberculosis and malignant disease by the history of the case and the general condition of the system.

Prognosis. In all cases it is a slowly progressive disease, and in a large measure amenable to treatment when taken early. Very few cases confined entirely to the mucous membrane have been reported as incurable, and they often heal without leaving a scar. This is not so when the cuticle is the seat of the disease, as in these cases cicatrices always are left after the healing process is over. When the lesions are extensive, the prognosis is not so favorable, the development being indicated by the growth of new nodules, in continuous succession into the surrounding tissue.

Treatment.—Among local applications lactic acid is received with favor. The parts should be first cocainized, and then freely rubbed with a 50-per-cent. solution. This can be gradually increased to 75 or 100 per cent. Care should be taken to apply it to every part thoroughly, the applications being repeated every second or third day. In some cases this is said to destroy the growth.

Lake has had good results from the administration of thyroid extract in doses of a little over 1 gramme per diem, the disease almost disappearing under its use.

For years, too, tuberculin has been used with more or less favor by a number of European writers.

Of directly surgical treatment, evulsion by Volkmann's spoon or a sharp curette has many advocates—dusting the surfaces after-

ward with iodoform or brushing them with lactic acid. Burning the nodules down with the galvano-cautery is advocated by Bresgen. Tresilian successfully treated a case recently by scraping with a sharp spoon, subsequently burning it with galvanocautery, and then brushing with 50-per-cent. solution of lactic acid. Dundas Grant also, in one of his latest cases, was equally successful by a similar line of treatment.

GLANDERS.

This is a communicable disease, peculiar to higher animals, particularly horses, and liable to spread to man upon exposure to infection. It is also contagious among men. In its acute form it is very virulent and uniformly fatal. When chronic there is a little more hope of recovery. The usual site of attack is the mucous membrane of the nose, from which it may spread to both pharynx and larynx. The incubation-period is from three to six days.

Pathologically there is a low-grade inflammation, resulting in formation of granulation-tissue containing large numbers of bacilli. The characteristic germ of glanders is the bacillus Mallei. Rapidly-spreading suppuration and ulceration follow along the line of the lymphatics. Glands become swollen. Pyæmia, necrosis of bone and cartilage, deep abscesses among the tissues, all follow. The discharges are also profuse and offensive. The chronic form differs only from the acute in being somewhat milder. (Kyle.)

Constitutionally there is marked fever and prostration. The disease may last from fifteen to twenty days, death taking place by coma and collapse. Treatment, although practically useless in the majority of cases, consists of supporting measures, together with antiseptic nose and throat douches and sprays. (Lennox Browne.)

CHAPTER XXVIII.

RHINOSCLEROMA.

THIS disease occurs but rarely. It is characterized by the deposit in all the layers of the skin or mucous membrane of dense, hard nodes, or plates. The first deposits are usually in the neighborhood of the nostrils, gradually extending into the fossæ. The progress, from all records of the disease, appears to be steady, irresistible, and almost, if not entirely, uninfluenced by treatment.

It is believed to owe its origin to the rhinoscleroma bacillus which has been extracted and cultivated by Pawlowsky and Freudenthal. The latter gives a complete history of a case treated by him in 1896. It occurred in a Galician Jew aged 45. The nose was of immense size. The right side presented a tumor as large as a hen's egg. It was dark-bluish red, with a few vessels coursing over it and of ivory hardness. There was a separate nodule in the upper lip. The right inferior turbinated was involved in its whole extent, completely occluding the passage. The pharynx was a mass of scar-tissue, the uvula destroyed, and the naso-pharynx and the glottis almost entirely shut off, so that a tracheotomy-tube had to be inserted to permit of respiration.

There is little, if any, pain in this disease, except when the extension of the growth is very great. Then the physical obstruction to mouth and nose may produce great distress. There is no tendency at any time to ulceration or softening of the tissues.

In Péan's case the nose was surrounded by dense lardaceous neoplasm. The upper lip had degenerated and the rhinoscleroma had extended through the maxillary and ethmoid sinuses.

The pathological condition is believed to be one of infiltration into the affected tissue of masses of small, round cells. These cells are gradually transformed into spindle cells, and then into dense fibrous connective tissue. Corneil found a small, rod-like bacillus inclosed in a hyaline capsule, the same that is spoken of by Freudenthal and Pawlowsky.

Treatment.—It is usually regarded as entirely incurable. Oper-

ative treatment has so little effect that it is considered useless, except when required to restore the possibility of respiration. Internal medication is also useless. Notwithstanding this, Dontrelepont reports a cure from the application of a 1-per-cent.-corrosive-sublimate ointment twice a day for three and one-half months. As Bosworth remarks: "May this not have been a syphilitic case cured by mercurial inunction?"

Pawlowsky treated two cases by hypodermic injections of rhinosclerin, or the chemical extract of cultures of rhinoscleroma. The injection of the extract in a patient 18 years old produced feverish reaction and swelling of the affected nose. A month later, after 15 injections, the *plaques* were softened and there were signs of acute inflammation. He treated this case for a year, and during that time the disease had not advanced. In a second case treated the same way, although it was not cured, there was during six months no increased development. Hence the author believes, from the history of these two cases, that he has found in rhinosclerin a diagnostic and therapeutic agent for this disease.

Péan tried surgical treatment in the case of a woman aged 20. By extensive operation he removed the nose and all the upper lip and the turbinated bodies, resecting the ascending part of the maxillary bone and curetting the antrum. He approximated the cutaneous flaps. All that was left was a large hole in the middle of the face. Subsequently cauterization of suspicious parts was performed with Canquoin's paste. How long the patient lived we are not informed.

CHAPTER XXIX.

SYPHILIS.

THE indications of syphilis in the nasal passages are identical with their local manifestations in the other organs of the body, and need not be entered into minutely here. The primary lesion, or hard chancre, is one of the rarest of intranasal lesions. Still, cases are recorded of its occurrence. Its history and appearance, aided by the process of exclusion, should render its recognition easy.

The mucous patch, although rare, is one of the most frequent manifestations of early syphilis in this region. The tendency of the disease to develop at the muco-cutaneous border-lines of the lip and nostril exists here, as at the anus and vulva, although in the former region the cases are very infrequent. Devasse and Deville, in reporting 186 females suffering from mucous patch, only found 8 in which the patch affected the nose.

The superficial ulcer is believed by many to occur only in the secondary stage, two or three years after the primary sore, and to be caused by the softening and breaking down of a mucous patch. Bosworth believes that it belongs to a later date of the disease, and is the result of softening and erosion of superficial gummatous deposit; particularly as the latter gives so little indication of its presence that it may be overlooked until the attention is drawn to the more notable features of the fully-developed ulcer. The site of superficial ulcer is usually the septum or the floor of the nose; but this is not invariably the case. At the present time I have a patient, a married man, who has superficial ulcer of the left middle turbinated and also of the post-pharyngeal wall.

Bony necrosis is a result of extension of deep ulceration, through gummy deposit, and hence is of a tertiary nature. Among European races it occurs ten or fifteen years after the primary disease. Among some of the earlier races, particularly the Chinese, Arabs, and Mexicans, the disease is more virulent and runs a more rapid course. Most of these bony lesions occur upon the septum, the turbinateds coming next; that is, when the muco-cutaneous surfaces are not invaded first.

Pathology.—Syphilitic lesions, wherever found, are all of an inflammatory character, and the nasal passages are no exception to the rule. In primary lesion of the nasal mucous membrane the febrile action runs high, and the ulcer may present a large granular mass, filling up the nostril and causing deformity, while the slightest pressure may produce bleeding. The mucous patch and the superficial ulcer will differ little from their appearance in other regions. There need be no great thickening without the ulceration arises from an enlarged gumma, the chief stenosis being caused by the abundance of muco-pus constantly secreted.

When the gummy tumor forms, it indicates an active condition of the tertiary stage. There may be large deposit of gummatous material with infiltration or tumefaction of the membrane. No part of the nasal cavity may escape the deposit. The ulcerative process early invades the gumma, and bone as well as cartilage may soon be involved.

Sometimes surface-ulceration ends in resolution and culminates in cicatrization; but in the majority of cases the underlying perichondrium or periosteum partakes in the ulceration, and necrosis of bone or cartilage follows.

Symptomatology.—When the disease is primary—that is, the result of direct contagion—the ordinary symptoms of chancre may be expected, only in an aggravated degree. There will be inflammatory swelling, pain, difficult nasal breathing, discharge, and considerable fever.

In the secondary stages, as variously manifested, there will be coryza from mild to purulent. The mucous membrane will be puffy, red, and congested. Greenish-yellow pus will exude from the nostrils, and, after thorough cleansing, ashy-gray patches may sometimes be seen.

In the tertiary type ulceration is deep and formidable, being surrounded by ragged edges and an angry-looking areola. The cartilages and bones being involved, foul, offensive pus, with shreds of necrosed cartilaginous and osseous tissue, come away, until eventually both cartilage and bone may be destroyed, leaving unsightly facial deformity. In the severest cases the triangular cartilage, perpendicular plate of the ethmoid, vomer, and even the turbinateds are all involved in the ruin, nothing but Chinese “nose-holes” being left—mere apertures in front of an irregularly-flattened face.

In one case that came under my observation the whole of the

internal nasal structures had become detached from their surroundings, and formed into a huge, foetid, movable mass. This occurred in a married woman aged about 30 years. The condition, I was informed, had existed for a number of years and she was not referred for special treatment until a small perforation through the hard palate had formed, allowing the foetid secretions to trickle through into the mouth. The treatment consisted of breaking up the mass, extracting the fragments through the anterior nares, and washing out the cavity. Internally the syrup of the iodide of iron was administered.

Diagnosis.—When all other diseases have been put aside by a process of exclusion, a resort to constitutional treatment may help to remove all remaining doubt as to the true nature of the disease.

Prognosis.—This depends largely upon the extent and severity of the lesions. If the general health has not materially suffered, and the lesions are of a superficial character, treatment should be followed by the best results. Even when bone and cartilage have become involved, when this destruction is merely local it may be possible to arrest it in its progress. And, even in the worst cases, some little good may be expected from judicious and careful treatment.

Treatment.—This is one of the few nasal affections in which systemic medication is absolutely essential to effect complete resolution. Specific treatment, aided by soothing and cleansing lavage of the nasal fossæ, will in many cases effect a cure. The main thing is to commence the internal treatment at once. Then the local treatment, to be guided by the requirements of the case, after washing out the nasal cavity with a solution of boric acid, by means of an atomizer:—

1. R	Acid. boric.	6
	Aqua	30
M.		

Aristol or iodol might be thrown into the fossæ by insufflators, or the parts might be touched with tincture of iodine. Nitrate of silver fused on the end of an aluminium applicator will frequently control ulcerative action. Galvanocauterization is rarely necessary

1. R	Acid. boric.	gr. x.
	Aqua	℥j.
M.		

in this disease. In some cases of extensive ulceration light singeing of the parts exercises a controlling influence.

As to internal medication, Sajous recommends red iodide of mercury in doses of 4 milligrammes three times a day, particularly in secondary affections. After ptyalism has occurred, he substitutes iodide of potassa for the purpose of elimination. In the tertiary form mercury is less effective than the iodide, which should be given in full doses to produce the desired result.

When mercurials are required, it matters little what special form is used. The main features are to choose the preparation least objectionable to the stomach, to give it in minute doses, and to watch its effect, keeping its influence upon the system thoroughly under control.

When osseous or cartilaginous necrosis takes place the breath becomes horribly offensive, and operative procedure may become necessary to save the patient from absorption of necrotic material. The sharp spoon or curette in these cases will do the best service, followed by thorough antiseptic and aseptic treatment.

Supporting measures in the way of tonics, codliver-oil, good diet, daily baths, warm clothing, abundance of pure air, and thoroughly hygienic surroundings are all of essential benefit.

CHAPTER XXX.

CONGENITAL SYPHILIS.

It is still an unsettled question whether a syphilitic father can transmit the disease to his child without affecting the mother at the same time. It is believed, however, that if either parent is affected by the disease at the time of impregnation, the unfortunate offspring will, as a consequence, be the sufferer.

Symptomatology.—Coryza, together with some diffuse form of cutaneous eruption, is usually the earliest symptom. The coryza, as a rule, is watery at first. There is also swelling of the nasal mucosa, sufficient to impede or prevent nasal respiration. Gradually the discharge becomes muco-purulent, producing irritation of the nostrils and upper lip, with crust-formation. The discharge is more irritating than that produced by an ordinary cold. Syphilitic children are apt to be pale and cadaverous looking, and may have the withered look of age even during the first year. This may be partly due to inability to take a proper amount of nourishment, from the too-often careless mother, owing to nasal stenosis produced by the disease.

Congenital syphilis of the nose usually runs a rapid course. In many cases ulceration of the septum and nasal cartilages quickly follow the coryza. Bone is laid bare, sloughing of tissues and necrosis of bone may follow, with fœtid catarrh and deformity as direct results. The deformity of saddle-back nose, produced by destruction of the septum and sinking in of the tissues, frequently has its origin in inherited tertiary disease of childhood. The course of the disease is more rapid in infantile than in adult life, owing to the lessened power of resistance which exists in young children. Among the curious results of this disease is one reported by Gibb Wishart, in which, together with great destruction of the bony frame-work of the nose, there is also the development of a tooth within the nasal fossa.

Diagnosis. In the otherwise-healthy child, ordinary acute catarrh of the nasal passages speedily undergoes resolution. Syphilitic rhinitis of childhood, on the other hand, is noted for its continuity and the severity of its symptoms; also for the unhealthy cachexia of

its victims. The diagnosis from ordinary purulent rhinitis of childhood should not be difficult, as syphilitic rhinitis will be manifest during early infancy, whereas purulent rhinitis does not usually appear before the third year. The syphilitic cachexia, and the characteristic cutaneous eruption, also, do not present themselves in the milder disease.

Prognosis.—The earlier the positive symptoms appear in the life of the infant, the more severe the disease and the less the prospect of recovery. When the symptoms are manifest at first nasal stenosis is usually so great as to interfere with nursing. Malnutrition is the result, with consequent decay in vitality. The nasal septum soon ulcerates away, and falling in of the bridge may be the result, if the little patient survives long enough to experience the deformity.

On the other hand, if the disease is lighter, the symptoms appearing later, the nasal tissues may not be destroyed, and under proper treatment there is hope of cure.

Treatment.—Cleansing and soothing treatment of the irritated and inflamed mucous membrane is very important. To shrink the swollen tissue, by diminishing turgescence, and at the same time to lessen the sensibility of the nerve-filaments, the use of a weak solution of cocaine is advisable. In making the solution, however, it should be remembered that muriate of cocaine and biborate of soda are incompatible, an insoluble borate of cocaine being at once formed. Bicarbonate of soda and muriate of cocaine are also incompatible, the cocaine alkaloid being deposited, and chloride of sodium being left in solution.

Either of the following prescriptions would, however, answer the purpose:—

1	R Cocaine hydrochlor	2
	Acid. boric	5
	Aquam	ad 30
	M	

Either of these might be used as a spray to the nares; but a better plan, according to my experience with young children, would be to apply it by means of a pledget of wool upon a cotton-holder. With the child in the recumbent posture, it can be placed within the nostril more effectually and will be received with less opposition.

1.	R Cocaine hydrochlor	gr. iij
	Acid. boric	gr. viij
	Aquam	ad 3j
	M	

Or

- | | | | |
|----|----|--------------------------|---|
| 1. | R | Cocaine hydrochlor. | 2 |
| | | Ammon. hydrochlor. | 3 |
| | | Aquam .....ad 30 | |
| | M. | | |

might be used in the same way.

Then, after the shrinkage of the nasal mucosa which a few minutes' action of the cocaine would produce, the following or some similar preparation might be applied in the same way:—

- | | | | |
|----|----|------------------|----|
| 2. | R | Thymol | 13 |
| | | Menthol | 3 |
| | | Albolene .....30 | |
| | M. | | |

The parts by this time being anæsthetized, the child will probably submit to the use of the spray. If not, the cotton-holder can be used with this solution as before, pressing it gently through the nostril to better cleanse the passage. If sneezing is produced by it, a good purpose will have been accomplished, as the sternutatory efforts will involuntarily clear the nostrils of secretions.

As a local application to the upper lip and inflamed anterior nares, the following has a soothing effect, applied as often as required:—

- | | | | |
|----|----|------------------------|---|
| 3. | R | Ung. zinci oxidi | 8 |
| | | Vaselin alba | 8 |
| | M. | | |

For ulcerative action within the nostrils aristol, iodol, iodoform, etc., may any of them be used by insufflation after cleansing.

This treatment, while beneficial to the local manifestation of the disease, can do nothing toward eradicating it from the system.

-
- | | | | |
|----|----|--------------------------|----------|
| 1. | R | Cocaine hydrochlor. | gr. iij. |
| | | Ammon. hydrochlor. | gr. v. |
| | | Aquam .....ad 3j. | |
| | M. | | |
| 2. | R | Thymol | gr. ij. |
| | | Menthol | gr. v. |
| | | Albolene .....3j. | |
| | M. | | |
| 3. | R | Ung. zinci oxidi | 3ij. |
| | | Vaselin alba | 3ij. |
| | M. | | |

This can only be accomplished by constitutional means, and the best of these is the internal administration of mercury. This can usually be accomplished by the stomach. Minute doses of any of the mercuricals may be given, governed by the fixed rules which guide the administration of these drugs. If the stomach is disturbed by the mercury, inunction may possibly yield better results.

General rules with regard to food and hygiene should, of course, be enforced.

DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.

CHAPTER XXXI.

ACUTE SINUSITIS.

It is generally conceded, with regard to chronic inflammation of different regions of the nose and throat, as well as other organs of the body, that they must of necessity be preceded by acute inflammatory action of one form or another. Why diseases of the antrum, ethmoid cells, and sphenoid sinus should be exceptions to this rule it is difficult to say.

As Lennox Browne tersely says, "Acute sinusitis is *frequent*," although the fact, for which abundant proof has been given, is not as yet generally admitted.

Weichselbaum, of Vienna, performed autopsies upon the bodies of a large number of patients who had died of influenza. In 90 per cent. of these he found evidences of inflammation of one or other of the accessory sinuses.

Fränkel, of Hamburg, likewise performed autopsies upon the bodies of 146 patients, followed by bacteriological examinations of the contents of the sinuses. They were found to be all subjects of sinusitis without one of them being discovered during life.

Bacteriological examinations have proved that numerous bacilli enter into the development of acute sinous disease. Among these are the diplococcus lanceolatus in the pneumonic form of antral disease. Streptococcus is sometimes found in pure culture. Staphylococcus is usually associated with the other organisms. Bacillus pyogenes foetidus, bacterium coli, and *Aspergillus fumigatus* have all been discovered in some cases.

Etiology.—Acute endorhinitis, or, as it is usually called, acute rhinitis, is the most frequent cause of sinous disease. Next to this may be considered the infectious diseases: scarlet fever, measles, typhoid fever, and small-pox. Another cause not sufficiently appreciated by the profession is the presence of tampons of absorbent cotton within the nasal cavities, placed there by the surgeon, either to check hæmorrhage or as an after-treatment following operation.

A severe case of acute purulent sinusitis, arising from the first-mentioned cause, came recently under my observation. It occurred in a physician aged 40. The symptoms were fullness and heaviness in the region of the antrum, with copious discharge through the ostium, particularly upon bending forward. The antrum healed up in a short time without any special treatment other than that required for an ordinary cold.

The maxillary antrum is the sinus usually affected in this disease, though sometimes the ethmoid cells may be the primary seat of lesion. Sometimes the inflammation may attack the two successively.

Symptomatology.—The subjective symptoms are usually those of acute nasal catarrh, affecting the one side particularly. There may be neuralgia in the region of the orbit, with photophobia and lachrymation, together with a general feeling of malaise. These symptoms appear to be amenable to treatment.

Physical examination without first applying cocaine to shrink the tissues will usually be without avail, owing to the swollen condition of the mucous membrane. After the shrinkage, however, if suppuration has occurred, the middle turbinate of the affected side will be seen more or less bathed in pus. There will likewise be tenderness on pressure upon the affected side.

The majority of cases of acute sinusitis get well without treatment, for the simple reason that they pass away without ever being discovered. Still, it is very probable that a large number of cases of chronic sinusitis have originated in the acute form, which by timely treatment might have been arrested.

As Lermoyez has well said, acute sinusitis is almost invariably amenable to cure without operation, while in chronic sinusitis no remedies are available except the surgical.

Acute sinusitis is supposed to last about eight days, subacute is extended to two or three weeks, while a longer existence merges it into the chronic disease.

The proportionate danger arising from acute inflammation of the antrum, ethmoid cells, and sphenoid sinus is in the inverse ratio to their frequency. Acute disease of the antrum, although the most frequent, is the mildest in type, owing to its greater distance from the meningeal membranes. The ethmoiditis is more severe on account of danger of inducing basilar meningitis and orbital complications, while acute inflammation of the sphenoid sinus, although so

rare as to be almost unknown, is supposed to be the gravest of all when it does occur, owing to the possibility of inducing cavernous thrombosis.

Treatment.—This should be along the lines already indicated for the treatment of acute rhinitis. Mild catharsis in the commencement of the disease, followed by $\frac{1}{4}$ -gramme doses of quinine two or three times a day, together with tablets for the night-time, composed each of $\frac{1}{2}$ centigramme of morphia and $\frac{1}{10}$ milligramme of atropia, repeated every two or three hours until sleep is induced, may be considered an advisable course of systemic treatment. When fever is present drop-doses of tincture of aconite every hour has a good effect.

Local treatment by 2-per-cent. spray of cocaine will relieve the intranasal congestion, the astringent effect of which may be prolonged by following it with spray of 2 per cent. of menthol in albolene. This, repeated as often as required, will favor freedom of discharge and hasten the healing process as the slight fever abates.

CHAPTER XXXII.

CHRONIC DISEASE OF THE ANTRUM OF HIGHMORE.

THE antrum of Highmore, being the largest of the nasal accessory sinuses, and the one most frequently affected with purulent disease, is worthy of the most careful consideration (Fig. 66). The term indicates a chronic inflammatory condition of the mucous membrane lining the superior maxillary sinus, attended by the formation of pus. This gradually fills the cavity, and, having no other outlet, when the purulent matter reaches the height of the ostium maxillare it trickles over into the middle meatus, beneath the middle turbinated body, and is discharged by the anterior and posterior nares.

Pathology.—At the commencement of the disease the mucous membrane of the antrum is slightly swollen and hyperæmic. Some-



Fig 65. Caseous mass washed out of antrum through ostium maxillare

times the blood-vessels rupture in different places, causing little spots of ecchymosis. As the disease advances, the membrane thickens, in some cases becoming infiltrated and in others covered with granulations. Not infrequently œdematous nodules form, which in time take on the myxomatous aspect, until clusters of small polypi may be found hanging round the internal border of the ostium. Kanthack records a case of polypoid growth within the antrum. Symonds found several in one antrum varying between one and two centimetres in length. Roth says antral polypi are scarce. In the *Annals of Ophthalmology and Otology* for 1896 I reported a case in which what seemed to be soft polypi were washed out through a large hiatus semilunaris, the nozzle of the syringe being placed in one end of the passage. The accompanying cut (Fig 65) gives the exact size of the largest, after being in alcohol over two years. Microscopical

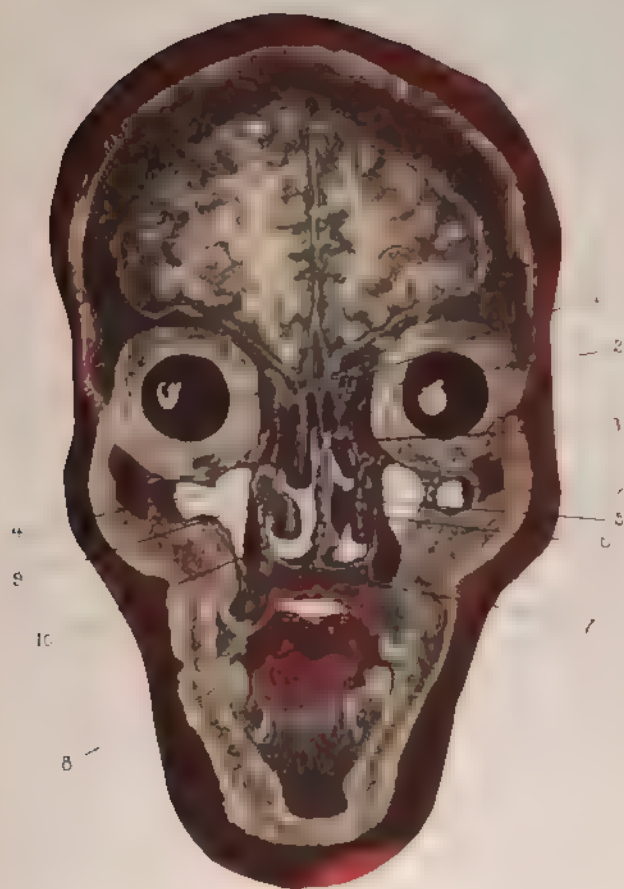


Fig. 66. Lateral frozen section through the middle region of the nose. 1, Ethmoid cells. 2, Superior turbinate. 3, Middle turbinate. 4, Antrum of Highmore. 5, Union or synchia, between septum and inferior turbinate. 6, Inferior turbinate bone. 7, Hard palate. 8, Tongue. 9, Middle meatus. 10, Inferior meatus. From PROMERIE's Anatomical Museum, University of Toronto.

examination of the same at the present time proves it to be nothing but a mass of caseous matter, composed of cell *detritus* and polynuclear leucocytes. Cases occasionally occur in which the fluid of the pus becomes absorbed and the cellular elements undergo fatty degeneration. This is the caseous form of the disease, and it is accompanied by numerous bacteria, such as *staphylococcus pyogenes* and sometimes *Aspergillus fumigatus*.

Sometimes in advanced cases the periosteum becomes unusually active, and little juttings and spiculæ of bone will grow and project out into the antral cavity, even in rare cases bridging it across and by formation of their lamellæ dividing it into sections. In rare cases, also, cysts form by distension of lymph-spaces or ducts within the antrum (Fig. 68).

Etiology.—The old tradition handed down for generations, that decayed teeth were the usual cause of antral empyema, is advocated by Moldenhaur, Fraenkel, Beverly Robinson, and others, while Zuckerkandl, Chatellier, Demochowski, Schiffrers, etc., believe in its intranasal origin in a large majority of cases; and this accords largely with my own experience. Bosworth doubts the probability of actual extension of the disease from the nasal fossa into the maxillary sinus, but is of the opinion that the majority of cases arise (1) from closure of the ostium from pressure of nasal polypi, (2) from pressure of enlarged middle turbinateds, and (3) from extension of disease from carious teeth; while Nyles is of the opinion that the nose and teeth are about equal as causal factors in grave forms of the disease.

M. Saint Hilaire reports two cases (*Journal of Laryngology*, August, 1898) of empyema of the antrum of Highmore caused by plugging the nasal fossæ. One occurred in a lady, aged 52, who had been suffering from albuminuria for two years. To check a severe attack of epistaxis Bellocq's cannula was used, plugging the anterior and posterior ends of the passage. In two days severe pain occurred in the suborbital region. The anterior plug was removed and two days later the posterior one also, but the antrum was full of pus. And three months later operation for its relief was performed.

The other was in a woman of 39. The nostril was plugged to check violent epistaxis. This, owing to similar pain as that of the first case, was removed two days later. Pain and cedema disappeared, but in a few days the antrum filled with pus, which could be seen in the middle meatus.

Symptomatology. If the disease is caused by inflammatory ac-

tion and secretion of pus induced by closure of the ostium, the cavity will in time become full, and pain from the pressure of retained secretions will result. When it arises from caries of the teeth, the ostium not being closed, the discharge escapes through the outlet and pain does not become so early or prominent a symptom. In either case, however, the jaw may be tender on pressure, and the teeth on the affected side may have a fullness and soreness on closing. Sooner or later fetid, creamy-colored discharge makes its escape, and flows from the nostril. The odor, one-sidedness, and color are characteristic of sinus disease. The point is to ascertain positively the source of its origin.

Diagnosis.—The diagnosis of antral disease is frequently obscure, and consequently a positive conclusion can rarely be arrived at upon the first examination. The presence in one nasal cavity of pus of a creamy color, and possessing an unpleasantly aromatic odor, while the other nasal cavity is free, is always sufficient to indicate that suppurative disease exists in one or other of the accessory sinuses.

The question is whether the disease is frontal, ethmoidal, antral, or sphenoidal? Sometimes, too, the muco-purulent discharge produced by the presence of nasal polypi, associated with atrophic disease, simulates the pus of antral suppuration. Foreign bodies and rhinoliths may also give rise to a somewhat similar discharge.

After cleansing the nostril the application of cocaine to the mucous membrane should materially aid in diagnosis.

Its astringent action upon the tissues will make the presence or absence of polypi certain. The same may be said of foreign bodies. These being excluded, the next question is: which sinus is affected? After thorough cleansing and shrinkage, the presence of a drop of creamy pus in the middle meatus, just external to the lower border of the middle turbinate, is almost of diagnostic value. If the pus is farther back and visible in the posterior nares, it may have come from the diseased sphenoid sinus. If farther forward in the vicinity of the infundibulum, from the ethmoid cells or frontal sinus; but in both the latter the tissues of the orbit would be likely to be affected. This rarely occurs in simple antral disease. When the quantity of pus is large, even after cleansing, whatever its origin, it may extend to all these locations, and the diagnosis becomes more difficult. Sometimes by bending the head forward, the exit of the pus from the ostium may be verified by examination with the nasal speculum immediately afterward.

The neuralgias which arise from sinusitis, wherever located, are not of much diagnostic value. Still, there is an uncomfortable feeling, a sensitiveness on pressure, and a tenderness of the affected jaw in closing the teeth, any of which may be caused by antral disease, but not by suppuration of the other sinuses.

Moreau Brown gives one sign in diagnosis which in my experience has been of little value. He says that after cleansing the pus away by a pledget of cotton, pressure upon the facial wall of the maxillary sinus will produce its reappearance. The maxillary bone seemed to be uninfluenced by any pressure which it seemed safe to make.

Irrigation is also recommended as an aid to diagnosis. That is, by passing the point of a Eustachian catheter attached to a syringe into the ostium and washing out the cavity with warm water; the



Fig 67 Electric illuminator with flexible shank and cords

pus discharged would indicate the presence of the disease. It may, however, be remarked that when the passage is sufficiently open to admit the introduction of the catheter the pus can usually be seen issuing from the ostium without the use of the instrument.

Exploratory puncture as a method of diagnosis has always received a certain amount of favor. It is made either through the inferior meatus, the canine fossa, or the oral cavity, between the second bicuspid and the first molar teeth, and internal to them. With all the present means of exploration at command, it is doubtful whether puncture will ever be frequently required in the future. Chiari, in giving the history of one hundred cases, says that the rhinoscopic examination gave such excellent diagnostic results that he only required to puncture fourteen times through the inferior meatus, to insure a correct diagnosis.

Of all the aids to diagnosis, probably transillumination, by

placing a guarded electric lamp in the back part of the closed mouth, introduced by Voltolini, stands the first (Fig. 67). Although of undoubted value, the amount of weight attached to it by different rhinologists varies very greatly. Gouguenheim says that transillumination is often embarrassing. On using it he has found well-marked suborbital umbra, indicating pus, and upon opening the antrum found none—the darkening being caused by a thickened mucosa. Grant, on the other hand, thinks it may often be useful in a negative way. In several suspicious cases, where pus was believed to be present, he found on transillumination the translucency so clear that empyema of the sinus could be positively excluded.

These are only exceptions, however; as a rule, the use of the electric lamp in the mouth will produce an umbra, of more or less density beneath the lower eyelid in each case of antral disease. Mulligan tells us he uses Voltolini's lamp in every suspected case; and wherever it failed to produce a light zone beneath the eyelid, and a red and luminous pupil, on opening the antrum pus had been found.

Greville Macdonald lays great stress on the fact that where we have suppuration with granulation-tissue or polypi in the middle meatus, we can seldom be sure of the extent or severity of the disease. He says he has frequently seen cases when the suppuration of the antrum was supposed to be the whole trouble, but in which it was afterward proved that the frontal sinus and ethmoid cells were just as seriously involved, while, on the other hand, cases which had long been treated for so-called necrosing ethmoiditis turned out to be overlooked cases of profuse antral suppuration.

My own most recent case was of this double nature. I at first took it to be pure ethmoid disease, as there was profuse granulation and suppuration of the posterior ethmoid cells, accompanied by deep-seated pain in the eye of that side. Galvanocautery operation of the hyperplasia and curettage of the cells failed to check the discharge. Then I discovered that the corresponding antrum was involved. Removal of a molar tooth, perforation of the alveolus, and daily washing out with hot boiled water in a few weeks, together with the previous treatment, removed the whole of the double disease.

For several years I have used transillumination by the electric lamp in all cases where I suspected antral suppuration; but I cannot say that the result has been sufficiently marked to make the diagnosis positive by it alone in a single case. I have not opened an antrum without finding pus; but still the umbra from illumination was not

decided enough, even with the darkened pupil added, to justify an operation without the presence of other equally positive signs.

Prognosis.—These cases involve little danger to life; yet spontaneous recovery from chronic suppuration of the antrum rarely, if ever, occurs. By careful and persistent treatment, however, all cases can be relieved, and many of them cured.

Treatment.—Bosworth tells us: "The essential feature of the treatment of a case of suppurative disease of the antrum consists in opening the cavity for proper drainage, and subsequently its thorough cleansing and disinfection."

In the latter clause all rhinologists agree. They agree also in the former, while they differ widely in their methods of procedure. Still, they unitedly accept as imperative the removal of any polyp, granulation tissue, or hypertrophy of the middle turbinated which might be obstructing the ostium maxillare.

The direct treatment of the suppuration may be conducted in one or other of the following ways:—

1. By direct irrigation through the ostium. Garel, of Lyons, is the great apostle of this method of treatment. He claims that it can be accomplished in a large majority of cases, and that the antrum can be washed out regularly and completely without any artificial opening whatever. Out of 44 cases he succeeded by this method in 28, or 63 $\frac{1}{2}$ per cent; and out of these had to resort to other treatment in only 6 cases. The larger number were cured in a short time. The fluid used was usually a warm solution of boric acid. The instrument used was a Heryng catheter, inserted, with the point turned downward, between the middle turbinated and the outside wall. Passing the instrument upward to a position above the ostium, he turns the point outward and gently engages it in the mouth of the cavity. This requires careful manipulation, as the point of the instrument is in close proximity to the orbit.

At the first washing the discharge is purulent, foetid, and sometimes caseous; but before the irrigation is over the fluid returns from the naris perfectly clear. On each succeeding washing the pus decreases in quantity. After a few washings nothing comes away but a mass of gelatinous muco-pus, the water itself being quite clear. At each sitting the mass discharged becomes smaller and finally ceases, the patient being cured.

2. By opening through the inferior meatus, or Jourdain's method. Of this plan Dundas Grant is a very strong supporter. He

claims that as the antrum communicates with the respiratory passages, and not the digestive, the more natural opening will be by the nose. After applying a 15-per-cent. solution of cocaine to the mucous membrane, he uses Krause's trocar and cannula, penetrating the antrum through the wall of the inferior meatus. Withdrawing the trocar and leaving the cannula *in situ*, he attaches it to the point of the syringe, and washes out the cavity with warm solution of boric acid, the fluid escaping through the natural opening. After each treatment the cannula is removed. At the next sitting cocaine is again applied, the cannula reinserted, and the treatment repeated.

Grant claims that, although the treatment is somewhat difficult, yet the number of irrigations required, being less than by other methods, will justify its use.

Zeim, of Dantzic, criticizes this method severely. The difficulty of operating in this region, the thickness of the naso-antral wall in many cases, inefficiency in drainage, and the impossibility of personal irrigation by the patient are among the points which he emphasizes; and to these might be added the evil effects of successive applications of cocaine.

3. By removing a molar tooth and opening the antrum through the alveolus. This is Cooper's well-known method, and is warmly supported by Zeim, Harrison, Milligan, and Bosworth.

When the teeth are sound, Zeim condemns removal, and suggests perforating the antrum through the roof of the mouth in close proximity to the teeth, either between the second bicuspid and the first molar or between the first and second molars. The fact that the opening into the alveolus, or floor of the antrum, and the ostium maxillare are at opposite ends of the same cavity, must be conceded as an advantage in irrigation, while the facility it affords for personal treatment is also in its favor.

To keep the artificial opening clear, various silver and gold tubes have been devised for permanent insertion, during the period required for treatment. The tubes are attached by silver wire to the adjacent teeth, and plugged to prevent the entrance of food.

In many instances, however, when the treatment required is of limited duration, these tubes can be entirely dispensed with, as, with ordinary care, there is little if any danger of the food passing through the opening into the antrum.

4. Desault's plan of opening the canine fossa appears to be steadily gaining ground. It is claimed that the patient can treat

himself equally well in this way as through the alveolus, and that it will frequently prevent the sacrifice of a sound tooth. A tube with a plate attached to fit against the jaw can be retained, even better than in the alveolus, and without wiring. Plugging the tube is unnecessary, as there is practically no danger of food entering the antrum.

Some operators have invaded the canine fossa very extensively; and without hesitation chiseled away enough of the external antral wall to admit of digital exploration of the cavity. The antrum is then curetted and washed out and packed with iodoform gauze. This is changed regularly, the cavity being kept open until thorough healing takes place. Although revived recently, this plan of treatment is not new, for we read of la Morier as early as 1760 treating a case successfully in this way.

5. The Robertson method of combining the chiseling of the canine fossa with the perforation of the inferior meatus, in one or two places, has also a number of supporters. Scanes Spicer favors this plan of treatment, as the only one securing thorough and effectual drainage in many of the most difficult cases. He makes a large opening in both the anterior and internal sides of the antrum. These openings are intended to be permanent. He then irrigates thoroughly with boric solution, and follows this by packing the cavity lightly with creolin gauze. This is left in for forty-eight hours and then removed. No form of tubage or mechanical drainage is used, but the cavity is syringed out daily with a similar warm solution. The patient is directed to blow out the cavity frequently, from the nose to the mouth, and also from the mouth to the nose. He claims rapid healing, and, although the perforations contract, they usually remain permanently open to some slight extent, without inconvenience to the patient.

This multitude of methods all practiced to-day by leading rhinologists, each preferring his own special plan as the best, but utilizing some other method in exceptional cases, seems to prove that the results are not, on the whole, as satisfactory as we would like them to be. A few cases are cured quickly. Others take a longer time. All are relieved; but in many cases the treatment requires to be carefully, systematically, and persistently followed out, and that for a considerable time in order to secure a perfect cure.

It is undoubtedly true that many cases of antral disease come under the domain of the dentist for treatment, and many dentists

claim to be particularly successful in dealing with these cases. But this is not to be wondered at. The cases that come naturally under their charge are those of dental origin, the region of the ostium not being at all affected. And when the carious tooth is removed, the antrum perforated through its alveolus, and the cavity antiseptically washed out for a few times, it is natural for the lining membrane to heal. An entirely different state of things exists when the etiology is nasal; and it is this class of cases that usually fall into the hands of the rhinologist to deal with.

In my own practice the large majority of my cases have been treated through the alveolus. Although in several of these it took many months of treatment, yet they were all eventually cured. In one case the treatment was confined to washing out the antrum through the ostium maxillare with a warm solution of resorcin. This case healed rapidly and without return. In three I tried perforation through the canine fossa with insertion of a silver tube and followed by regular irrigation. In the first of these it was successful. In the second it failed. For three years the patient personally carried on the cleansing treatment, but declined to have any other operative treatment than the renewal of the tube as frequently as the old one wore away. In the third, after trial for weeks, there was no prospect of healing in the antrum, so a tooth was extracted, and a week or two of regular irrigation with hot boiled water effected a cure.

The second of these cases is worthy of further consideration. The patient was of a tubercular family, three brothers and his mother having died of pulmonary tuberculosis. A few months ago, as there seemed to be no probability of cessation of antral discharge, he finally consented to the extraction of the first molar tooth, and perforation through the alveolus.

Instead of fitting a silver tube to the opening, as I had done in his case in the canine fossa, I instructed him to make a hardwood plug to fit the passage, the lower end being large enough to prevent its slipping wholly into the antrum. This plan I had followed on previous occasions in the treatment of other cases with uniformly good results, the plug being removed each time irrigation was required, and replaced immediately afterward. After a few days, as the patient managed the local treatment efficiently, the amount of pus at the same time gradually diminishing in quantity, I told him that he need not return to the office again for a number of days. He returned, however, sooner than expected and, with a distressed expression of face informed me that the last and largest plug he had used had gone up into the antrum, and he was afraid that the previous one had slipped in also. It appeared that two nights previously he had fitted the plug into the alveolus on going to bed. When he awoke in the morning it was gone. He passed a probe into the hole, but could not feel it. Thinking that possibly he might have swallowed it, he made a

larger one and pushed it in tightly, after washing out the antrum. The next evening it was all right, but when he awoke in the morning he could just reach it with his tongue, and an hour later it had entirely disappeared.

On examining the antrum through the openings with the probe I could not find either of the foreign bodies. There seemed to be an abundance of space, and, washing through the alveolus, the fluid escaped freely from the

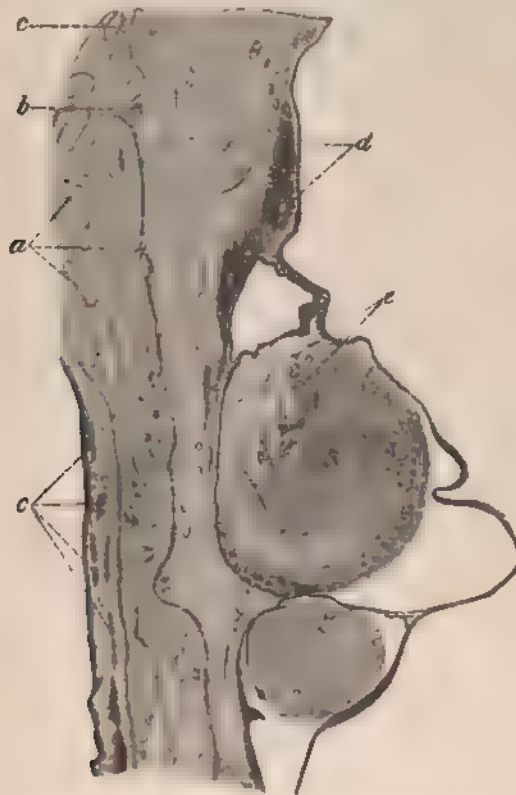


Fig 68—Coronal section of the maxillary sinus, the subject of cystic disease. *a*, Cancellous spaces in bony wall. *b*, Region of the crista turbinalis. *c*, Glands of nasal fossa. *d*, Glands of the maxillary sinus. *e*, Degenerating gland-tissue. The wavy lines around indicate the capsule of the cyst. (From Lennox Browne, 1899.)

nose through the ostium maxillare. On the patient's assurance that at least one of the plugs was in the antrum I had an anæsthetic administered, and, after dissecting back the tissues, with hammer and chisel enlarged the opening in the canine fossa to the diameter of a centimetre. Under the impression that

the foreign bodies, if there, would be on the floor of the antrum, I explored that region first, but could not find anything. Then I passed the forceps toward the ostium without success. After mopping out the cavity with absorbent cotton I again passed the forceps upward and backward. This time something was seized, but it required a good deal of traction to dislodge it, when out came a long and thick plug. Another attempt was made in the same region, followed by the extraction of a still larger one. I suppose that after they were engaged within the cavity, which was large, the force of gravitation, while lying on the back, together with the inspiratory force in breathing through the ostium, had drawn them upward and backward to the region in which they had become impacted. The smallest plug was two centimetres in length and half a centimetre in diameter, the larger one somewhat thicker, and half a centimetre longer. They were both of them without the bulge on the end that I had ordered.

CYST OF THE ANTRUM.

Two years ago Charles H. Knight wrote a comprehensive review of what was then known of this rare disease, closing with the history of a case. His patient complained of no symptoms except the deformity in the left malar region and gingivo-labial fold caused by the pressure of the tumor. On incising freely into the canine fossa the bony wall was found to be almost completely absorbed. Sixty grammes of thin, turbid fluid were drained away; the lining membrane was found to be closely adherent to the bone. Digital examination disclosed nothing abnormal. After washing out the cavity and packing it for three days with iodoform gauze the recovery and healing were uneventful. A year later there was no return of the cyst.

Lennox Browne says that: "Cystic sinusitis may originate in two ways: By distension (1) of lymph-spaces, (2) of the gland-acini or ducts. Fig 68, from a preparation by Alexander, of Berlin, exemplifies a condition due to the first-named cause. It is characterized by excessive cancellation of the bone, by distended gland-ducts, some patches of round cell infiltration, and a cyst-like inclusion of a mass of disused glands and blood-vessels."

CHAPTER XXXIII

ETHMOID DISEASE.

CATARRHAL affections of the ethmoid regions are not of infrequent occurrence; and in acute cases, when the inflamed cells are not occluded by the swelling of the surrounding nasal mucosa, the disease may subside and disappear with the general decline of the catarrhal condition. When the cells become blocked by pressure from without or from enlargement of the middle turbinated body, the inflamed conditions may take on suppurative action, even resulting in periosteal ulceration and ethmoid necrosis.

Pathology.—To Noland Mackenzie belongs the honor of lifting the veil that so densely obscured our knowledge of the pathology of this region. By an extensive series of investigations he has arrived at the conclusion that the so-called myxomatous degeneration of the ethmoid is not due to mucous change at all, but to simple inflammatory action. In this view he is strongly supported by Jonathan Wright. He believes that all the changes found in the ethmoid cells represent merely successive stages of the same affection; and that therefore divisions and subdivisions of ethmoiditis tend to introduce an element of confusion into our pathological conception of the disease (Fig. 69).

In opposition to Woakes's idea that all ethmoiditis is of the nature of necrosis, Mackenzie states positively, and in this he is supported by Hajek, that purulent ethmoiditis may endure for years, without producing any bone lesion, and that, therefore, the proposition that all ethmoiditis tends toward and usually develops into necrosis has no foundation in pathological fact. That it does so occasionally, however, he freely admits.

Two other facts he dwells upon; the one, that the ethmoid region affords a most excellent place for the study of the origin of the so-called nasal polypi; the other, the very striking similarity that exists between the young granulation-tissue found in the ethmoid region and the structure of round-cell sarcoma, and hence the possibility of error in diagnosis.

Myles accentuates two important facts in the pathology of ethmoid disease.

1. In extreme polypoid cases the ethmoid is rather brittle, and parts can easily be removed.

2. The bone is almost flinty hard in suppurative cases.

The pathology of ethmoid and antral disease resembles each other in the existence of suppurative process and in the significance of pressure in the origin of each.

Etiology.—The origin of the disease is frequently obscure.

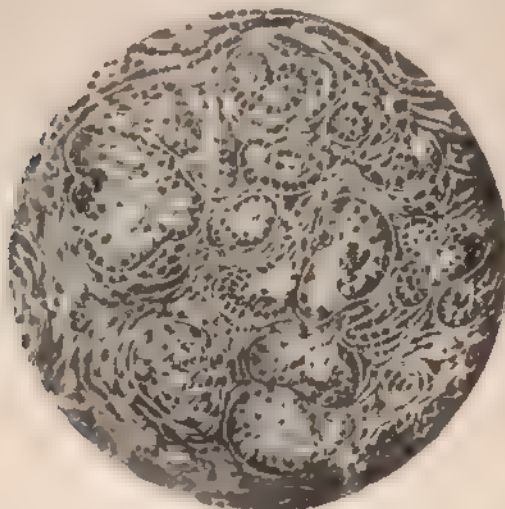


Fig 69 Inflammation of the ethmoid cells, showing glands to right quite normal and those to lower left hand more or less altered. In the extreme lower left the finely fibrillated tissue is a false membrane composed of hyaline fibrin with a few pus cells. (After J. Noland Mackenzie.)

Neglected catarrhal processes may produce permanent hyperæmia, resulting in retained secretions, with final suppurative action. It may also arise from pressure of nasal polypi, though by many writers suppurative action of the ethmoid cells is believed to be the cause of polypoid disease. Not infrequently the cause is an extension of the suppurative action from the other accessory cavities. According to Myles, two-thirds of the cases are due to the presence of polypi in the region

of the ethmoid cells, while in other instances atrophic rhinitis is sometimes the cause.

Constitutional debility—arising from tuberculosis, malignant disease, or syphilis—may also act as a predisposing cause.

Symptomatology.—Pain at the root of the nose and in the orbital and temporal regions is one of the earliest symptoms. This is associated usually with discharge of cream-colored pus, of a more or less foetid odor, from the naris. In some cases there is prominence or bulging at the side of the root of the nose. This, however, is not frequent except as a result of pressure from polypi associated with the ethmoid disease. When the anterior cells, which are two or three in number and situated external to the anterior end of the middle turbinated, are affected, exophthalmia may be present from pressure upon the wall of the orbit, and pus-infiltration may occur, through perforations of the orbital plate of the ethmoid. With the posterior cells, which are the same in number, though longer, the pain is not quite so severe.

Diagnosis.—After cleansing the nasal passage by the use of an alkaline spray, and shrinking the tissues by the application of cocaine, all other diseases but those of the accessory sinuses should be easily excluded. In distinguishing ethmoid from antral disease the throat-lamp should be of great service, as there is rarely, if ever, an umbra in purely ethmoid affections, whereas in suppuration of the antrum it is usually one of the distinguishing features. Ingals points out that, after thorough cleansing, pus from the antrum may be noted trickling down over the middle of the inferior turbinated, while in issuing from the ethmoid cells it flows over the posterior end. The deep-seated pain produced by ethmoid disease is also of diagnostic value, distinguishing it from antral, in which this symptom is usually wanting. The bulging of the eye forward does not occur as a result of either antral or sphenoid disease.

Prognosis.—Simple catarrhal ethmoiditis undergoes resolution in unison with the acute rhinitis to which it owes its origin. Woakes's necrosing ethmoiditis, in which caries of the bone exists, is a much more serious affair, and little likely to result in absolute cure. Suppurative ethmoiditis, occupying a medium position between the two, should be amenable to treatment, and result in cure in the majority of instances.

The disease is not dangerous to life unless it extends to the cranial cavity. More frequently, owing to the thinness of the walls

and its proximity to the eye, the orbit becomes affected, sometimes resulting in abscess. Operative treatment, combined with thorough cleansing and drainage, is often productive of good results.

Treatment.—In mild cases, unattended by hypertrophy, shrinking the parts with cocaine, and following this with sprays of solutions of either 15-volume peroxide of hydrogen, boric acid, or resorcin, should relieve the disease and quickly result in cure.

Any of the above might be used as follows:—

1	R Peroxide of hydrogen	7.5
	Aquam	ad 30
	M.	
2	R Acid. boric	2
	Glycerini	4
	Aquam	ad 30
	M.	
3	R Resorcin	1
	Aquam	ad 30
	M.	

In severe cases where suppuration exists without necrosis, operative treatment will be necessary. Polypi, if present, should be removed. Also any granulation-tissue that may appear in the neighborhood of the cells. This may be done by curetting or cauterization, and will clear the way for the antiseptic treatment already referred to. Direct opening of the ethmoid cells above the middle turbinated is a difficult operation. By removing the anterior end of this body it can be better accomplished and the anterior ethmoid cells more easily reached. This can be done by the use of the cold snare, curved scissors, gouge, cutting-forceps, or Grunwald's forceps. The cells can be reached by gouge and curette. The main features after operation are antiseptic treatment and free drainage. The application of lactic acid is sometimes followed by the best results. Gleitsmann favors the application of strong solutions of nitrate of silver in many of

1	R Peroxide of hydrogen	3ij.
	Aquam .	ad 5j.
	M.	
2.	R Acid. boric.	gr. xxx.
	Glycerini	5j.
	Aquam .	ad 5j.
	M.	
3.	R Resorcin	. gr. xv.
	Aquam	ad 5j.
	M.	

these cases, a cure being obtained by the combined surgical and local treatment in some instances in one or two months. He also lays stress on the importance of allowing the reaction of one curettement to pass off before another is accomplished in cases where this operation is necessary.

Myles drills or gouges an opening through the floors of the anterior and posterior cells, and then with the antero-posterior and lateral clippers cuts away as much of the floors as he considers necessary. All his patients treated by this method were relieved and some cured.

CHAPTER XXXIV.

SPHENOID DISEASE.

SIMPLE catarrhal disease of the sphenoid sinuses is probably, like the similar disease of the ethmoid cells, of frequent occurrence. The symptoms, however, are so masked by the associated diseases of the rhinal fossæ that they are unobserved, and the course and recovery become essentially uneventful. The situation of the sphenoid sinus is seen in Fig. 5.

Suppuration of the sphenoid sinus, on the other hand, although still very obscure, is a much more serious affection, and may lead to dangerous results. The symptoms, unfortunately, are not by any means distinctive, and it is difficult to diagnose it with any degree of certainty from the ethmoid disease. The etiological and pathological conditions are much the same; and the deep-seated pain of the post-ethmoid cells is difficult to distinguish from the deep-seated pain of the sphenoid. The discharge, similar to that from the other accessory cavities, flows more naturally down the post-pharynx, though a certain amount finds its way over the turbinated bodies. The eye symptoms are also similar, inasmuch as a larger plane of the sphenoid enters into the formation of the orbital cavity than can be said of the ethmoid, although bulging of the eyeball is usually an absent quantity.

In some cases after shrinkage by cocaine the probe can be passed gently upward and backward over the lower part of the middle turbinated, between it and the septum into the sphenoid sinus, and, after drying the passage, a small pledget of cotton passed in on a holder would indicate whether pus was in the sinus or not.

Flatau reports, in the *Journal of Laryngology*, etc., for 1895, having treated 26 cases of empyema of the sphenoid. Only once had he seen it in connection with ozæna; polypi were rarely present, except in cases in which the ethmoid and sphenoid disease were associated with each other. The most common complication found in this large number was with disease of the ethmoid cells. In many cases the etiology was doubtful, but in other cases it followed as a sequel of exanthematous diseases. In treatment he found that perforation into the sinus, with subsequent cleansing and free discharge, was necessary. Holbrook Curtis has devised an instrument for

irrigating the sinus after trephining, the patient being able to introduce the tube of the irrigator into the sinus without difficulty. Hajek's hook is said to be the best instrument for curetting the cavity.

Rosenburg has furnished some interesting facts about this obscure disease which are worthy of mention. He says that the age of patients vary from 19 to 35 years, and that it never arises as the result of syphilis or scrofula. The distance from the spina nasalis anterior to the anterior wall of the sphenoid sinus is from 6 to 7.5 centimetres, averaging 6.8 centimetres; and to the posterior wall of the same from 7 to 10 centimetres, averaging 8.5. The amount of space in the two nasal fossæ varies so much in certain cases that the twisted septum will allow a probe to be passed through the one nasal fossa into the sinus on the opposite side. He describes the subjective symptoms to be: burning in the nose; pain at the root of the nose, over the eye, and in the temporal region; shooting pains in the head, and a feeling of stuffiness. In one of his cases, attended by severe pain in the head, no pus could be seen, but, after the removal of the hypertrophied middle turbinated, pus flowed down from the sinus and the pain immediately disappeared.

In dealing with this subject, in a recent able article, Myles says: "The sphenoid cells are not so difficult to open as some are inclined to think. In cases where the septa are moderately straight and where the posterior end of the middle turbinated bone has been removed, the oozing pus can be easily detected at the point of the natural opening, high up and near the septum. The probe will often enter after careful use; a small, sharp, firm curette passed in and then pulled outward will often tear away the sides of the opening sufficiently for good drainage. I do not consider it safe to curette the upper and external walls of these sinuses. Careful scraping of the anterior wall and the floor often produces decidedly beneficial results."

FRONTAL-SINUS DISEASE.

Disease of the remaining accessory cavity, the frontal sinus, is a very wide subject, and an exceedingly important one. It falls naturally, however, under the domain of the oculist, and hence is usually treated by him. This volume is a treatise upon the nose and throat only, and, consequently, can leave frontal-sinus disease, without prejudice, within the limits of its own proper sphere (Fig. 2).

SECTION II.

Diseases of the Pharynx.

CHAPTER XXXV

ANATOMY OF THE PHARYNX.

THE pharynx is a musculo-membranous sac, lying between the back of the nose and the œsophagus. The base is upward beneath the base of the skull, and the apex downward terminating in the œsophagus, and on a level with the cricoid cartilage and fifth cervical vertebra. It is situated behind the nose, mouth, and larynx. In length it is between ten and eleven centimetres, and it is broader laterally than before backward. Its greatest breadth is midway between the palate and the œsophagus, and its narrowest at the œsophageal termination (Figs. 70 and 71).

The boundaries of the pharynx are, as roof, the basilar process of the occipital bone, and, as floor, the entrance to the œsophagus, the right and left sinus pyriformis, and the arytenoid cartilages and commissure of the larynx. Posteriorly it is separated from the upper four cervical vertebræ in the centre and the recti capitis antici and longi colli muscles at the sides by loose areolar tissue. The prominence of the arch of the atlas may often be recognized near the upper extremity of this surface. The anterior boundary is formed by the posterior nares, separated by the vomer, the internal pterygoid plates, the soft palate, the tongue when the mouth is closed, the hyoid bone, and the epiglottis. Each lateral wall is marked at its upper end by the pharyngeal orifice of the Eustachian tube and the fossa of Rosenmüller, and is connected with the styloid processes and their muscles. This wall is also in contact with the common and internal carotid arteries and internal jugular veins and with the eighth, ninth, and sympathetic nerves.

There are seven openings into the pharynx: the two posterior nares, the two Eustachian tubes, the mouth, the larynx, and the œsophagus. As described in dealing with the nose, the posterior nares are the oval openings which enter the pharynx on the anterior wall almost on a level with the vault. The two Eustachian tubes open one on each side of the pharynx, almost directly behind the inferior meatus. The mouths of these tubes are ovoid, or funnel-shaped; Roosa describes them as "trumpet-shaped orifices, nine millimetres high and five millimetres broad." The opening of the tube

is partly surrounded by a cartilaginous ring, which is most prominent posteriorly and above, lighter in front, and absent beneath. Behind the Eustachian orifice, and between it and the posterior wall of the pharynx is an elongated depression: the fossa of Rosenmüller. While at rest the Eustachian orifice is closed; but in the various motions of

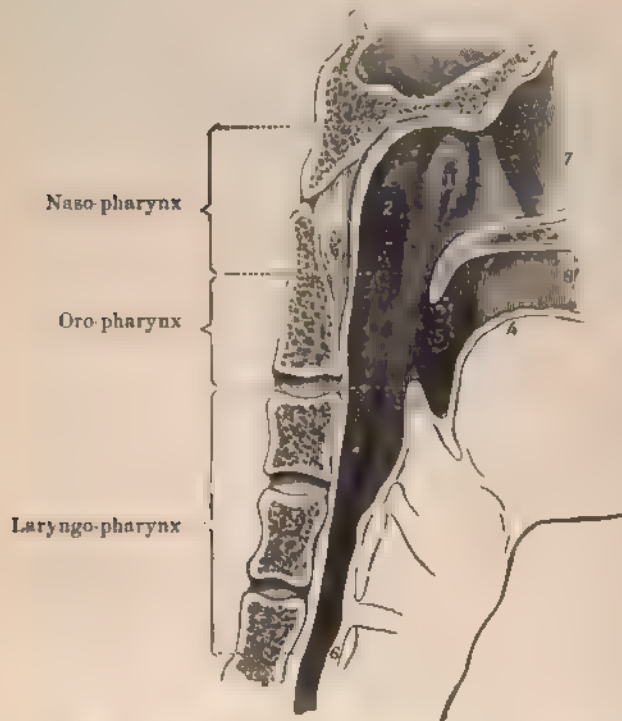


Fig 70 Sectional view of the pharynx. 1, Left Eustachian tube. 2, Left fossa of Rosenmüller. 3, Palate and uvula. 4, Tongue. 5, Left tonsil. 6, 6', Upper and lower boundary of larynx (epiglottis and cricoid cartilage). 7, Cavity of nares. 8, Cavity of mouth. (After Lennox Browne.)

the fauces it is frequently opened by the contraction of the tensor-palati muscles.

Directly behind and below the posterior nares lies the superior surface of the soft palate, with the uvula in its centre. Below that the mouth, then the base of the tongue, epiglottis, and larynx. The œsophageal opening is the apex of the pharyngeal cavity.

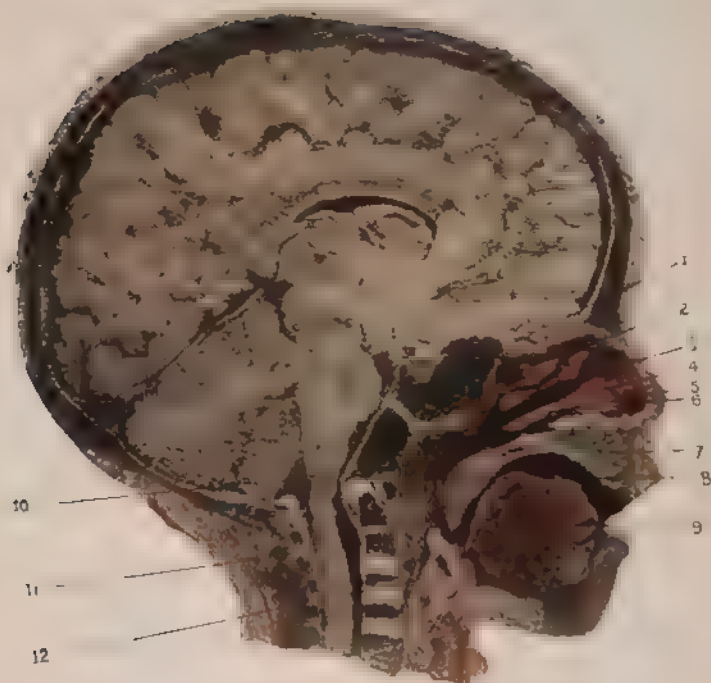


Fig 71. Frozen section. Side view of nose, pharynx, and larynx of child, aged 3 years. 1, Body of sphenoid. 2, Ethmoid cells and superior meatus. 3, Middle turbinate bone. 4, Middle meatus. 5, Inferior turbinate bone. 6, Vestibule of the nose. 7, Superior maxillary bone. 8, Soft palate. 9, Tongue. 10, Nasopharynx. 11, Epiglottis. 12, Larynx. (From Primrose's Anatomical Museum, University of Toronto.)

The pharynx is composed of three coats: a mucous coat, a fibrous coat, and a muscular layer beneath. The muscular coat consists of the superior, middle, and inferior constrictors; the levatores palati, and the tensores palati, together with the stylo-pharyngei and palato-pharyngei and palato-glossi muscles, a fuller account of which will be found in the standard works on anatomy (Fig. 72).

The fibrous coat is situated between the muscular and mucous layers; and is termed the pharyngeal aponeurosis. It is thick above.

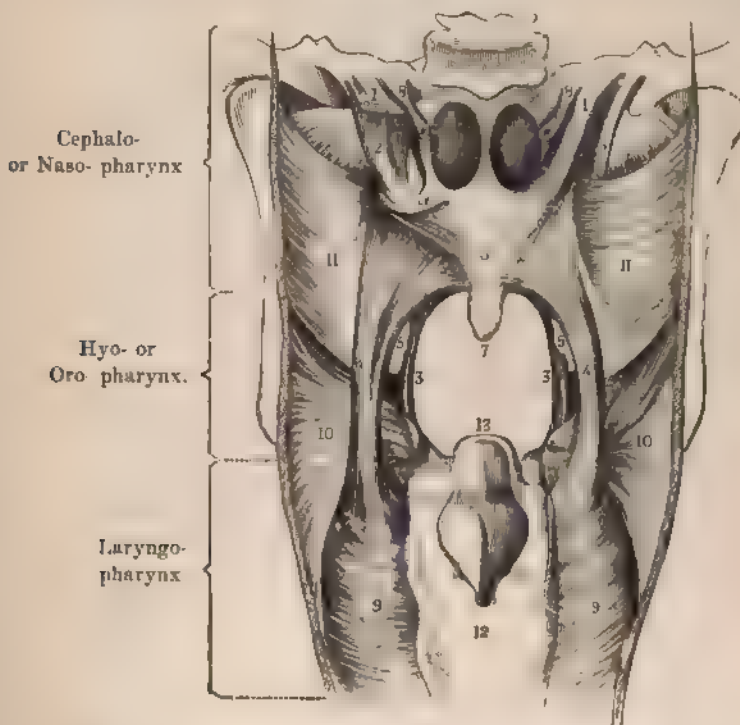


Fig. 72. The muscles of the soft palate and pharynx: the pharynx laid open from behind (modified from Gray). 1, 1, Levatores palati, the left being cut short near to its origin. 2, 2, Tensores palati, the left showing its reflected tendon and relation to the hamular process (a). 3, 3, Palato-glossi (anterior pillars of the fauces). 4, 4, Palato-pharyngei (posterior pillars of the fauces). 5, 5, Tonsils. 6, Azygos uvulae. 7, Uvula. 8, 8, Eustachian tubes. 9, 9, Inferior constrictors (laryngo-pharyngei). 10, 10, Middle constrictors (hyo- or oro-pharyngei). 11, 11, Superior constrictors (cephalo- or naso-pharyngei). 12, 12, Epiglottis and larynx not laid open. (After Lennox Browne).

Here the muscular fibres are absent and the fibrous coat is attached firmly to the basilar process of the occipital and the petrous portion of the temporal bone. As it descends, it becomes gradually lost in the true muscular coat beneath it.

The mucous layer is continuous with that of the nares, Eustachian tubes, mouth, and larynx. The upper surface of the soft palate, with the vault of the pharynx down as low as the floor of the nares, is covered with columnar ciliated epithelium, while in the oral part of the pharynx, below the palate, the epithelium is of the squamous variety.

The movements of the soft palate are controlled by the levator-palati, palato-pharyngei, and azygos-uvulae muscles, of which this flexible piece of mechanism is composed. Several of these muscles have also a direct relation to the Eustachian tubes by opening them when necessary to admit the entrance of air.

The pharyngeal glands are of two kinds, the follicular, simple and compound, scattered throughout the pharynx beneath the mucous membrane; and the racemose, in the upper pharynx between the Eustachian tubes.

The arteries are supplied from the ascending pharyngeal, the palatal branch of the facial, together with branches of the internal maxillary.

The veins enter into the internal jugular.

The nerves are derived from the second and third divisions of the fifth, together with branches from the glosso-pharyngeal and the vagus.

The pharynx, owing to its relation to the nose at the one end, and the larynx and oesophagus at the other, together with the fact that its posterior wall is an uninterrupted surface, may be considered as a single division of the respiratory tract. For physiological as well as pathological reasons, however, it is usually considered to be divided into two sections by the soft palate, known as the nasopharynx and the oro-pharynx.

In the naso-pharynx, the tissue or pharyngeal tonsil situated on the back wall and upon the base of the occipital bone, and known by the older anatomists as the racemose glands, frequently undergoes enormous development (Figs. 73 and 74). In its natural state it presents a soft, cushion-like surface. It is sometimes covered with rounded elevations. At others divided by deep fissures, running chiefly in a perpendicular or longitudinal direction. This mass of glands is

called the pharyngeal tonsil, or Luschka's tonsil, in honor of the man who first gave a full anatomical description of it. In the lower part of the tonsil in the medial line is sometimes found a small opening leading into the sac, called the bursa pharyngea. This sac may be from one to two centimetres long and from three to six millimetres wide. In the natural state this pharyngeal cushion should never in any part of it be more than four to six millimetres in thickness, gradually thinning away toward its outer margins.

THE FAUCIAL TONSILS

These two round or almond-shaped bodies do not belong to the pharynx proper, but are separated from it on each side by the palatopharyngeus muscle. They lie between the anterior and posterior pillars of the fauces, and directly above the base of the tongue. Their direct anatomical relations are thus described by Delavan: "The relations of the tonsil to the internal carotid artery are not so intimate as commonly supposed, for between the lateral wall of the pharynx, the internal pterygoid, and the upper cervical vertebræ there is a space filled with cellular tissue, the pharyngo maxillary interspace, in the posterior part of which are located the large vessels and nerves, and which lies almost directly backward from the pharyngo-palatine arch. The tonsil corresponds to the anterior part of this interspace, so that both carotids are behind it,—the internal carotid one and five-tenths centimetres, the external carotid two centimetres, distant from its lateral periphery."

The tonsil may be described as composed of lymphoid tissue. It presents on its outer surface a number of orifices varying from five or six to a dozen in number, leading down to the deep crypts of the tonsil. Besides these, from the researches of His, and during the past year of D. N. Paterson, we have had drawn to our notice the existence in the upper part of the tonsil of an anatomical space called the supratonsillar fossa. In the majority of instances careful examination will reveal a small recess in this situation, close to the anterior palatal arch, having a different folding and being much larger in every way than an ordinary crypt.

In young subjects, particularly, a web of membrane is frequently attached to the border of the anterior pillar, extending downward and backward over the tonsil. It is called the plica triangularis; and it is between this plica and the upper portion of the tonsil that the supratonsillar fossa is found.

The lymphoid tissue consists of two kinds: lymph-pulp and lymph-nodules. The pulp constitutes the greater part of the tonsil. The nodules form ten or twelve oval or round masses, immediately below the walls of the crypts, and situated within the lymph-pulp. They differ from, while in some respects they resemble, the Malpighian bodies of the spleen. They are surrounded by a dark zone of reticular tissue.

The lymph-pulp consists of lymphocytes inclosed in a delicate reticulum. The cells are larger and the reticulum coarser than in the nodules. The reticulum is formed of elongated cells inclosing lymph-spaces through whose walls lymph and migratory corpuscles readily pass from the capillaries. (Lennox Browne.)

THE LINGUAL TONSILS.

At the base of the tongue on either side of the glosso-epiglottic fold are situated two irregular nodular masses, varying widely in degree of development and of form. These are known as the lingual tonsils. Histologically they are identical with the faucial tonsils. The crypts are sometimes, however, lined with ciliated epithelium, and the cellular tissue is more dense than in the faucial region. Another important point in regard to them: they frequently do not commence to develop until adult life,—the period when the faucial tonsils have commenced to disappear.

CHAPTER XXXVI.

PHYSIOLOGY OF THE PHARYNX.

THE physiological functions of the naso-pharyngeal and oropharyngeal divisions of the pharynx are in some respects very distinct from each other.

The former has largely respiratory functions to perform, and, like the lower half of the nasal passages, is supplied with columnar ciliated epithelium, to aid in keeping the passage free from any secretions which might impede normal respiration. The naso-pharynx is also richly endowed with the glands of the pharyngeal tonsil, whose special function appears to be to secrete clear, colorless mucus for the purpose of moistening and keeping pliable the surrounding tissues and to help to lubricate the food ere it leaves the oro-pharynx for the lower alimentary canal.

The soft palate, or *velum pendulum palati*, hanging in mid-position in the pharynx, has several functional duties to perform. By pressing tightly the post-pharyngeal wall during the act of swallowing, it completely divides the pharynx into two parts, and effectually prevents food whether solid or fluid from entering the naso-pharynx. At the same time, by its pressure upward and backward, it forces down into the oral cavity the mucous secretion already spoken of. It also plays a very important part in the function of voice-production, which will be spoken of more fully when dealing with the larynx.

The tissues of the oro-pharynx are of harder and denser texture than those of the naso-pharynx. This enables it to perform the duties of deglutition without injury to its flexible surface. It has fewer glands than the naso-pharynx, and depends largely for the moisture and lubrication it requires upon the salivary glands and the mucous discharge from the pharyngeal tonsil.

Deglutition is a complex movement. After mastication the food is forced backward by the tongue pressing gradually from the tip to the base against the hard palate. As it reaches the pharynx, the faucial muscles come into play, forcing it still farther backward and downward, while the palato-pharyngei and levator-palati muscles pre-

vent its passage into the upper pharynx. At the moment that the faucial muscles contract, the muscles of the hyoid bone draw up the larynx behind the base of the tongue. By means of this complex movement the epiglottis is tilted backward, and the whole of the oropharynx is transformed into a funnel, down which the food is forced by muscular action into the œsophagus.

The physiological functions of the tonsils have long been an object of investigation. Formerly it was the prevailing impression that they were secreting bodies, the object of the secretion being to prepare the food for deglutition. At a latter day it was claimed that, like lymphatic structures generally, their mission was the production of white corpuscles of the blood. Hingston Fox and Scanes Spicer held this view, while the former gave them another mission: that of reabsorption of the salivary secretions after deglutition had been accomplished. Swain suggests that their real function may be to destroy pathogenic germs entering the mouth with the food; thus, the lymphatic cells or leucocytes of the tonsils would do the work of scavengers or phagocytes. Bosworth believes that, whatever their function, they are really absorbent organs, and that yet the crypts and tubular glands of the tonsil would indicate a secretory power, however limited. Bruschke is of the opinion that the tonsil, without being ulcerated or inflamed, may be the point of entrance for pyogenic micro-organisms. Semon also found evidence that the infecting micro-organisms in septic inflammation of the pharynx gain entrance through the tonsillar crypts, and Wagner, of San Francisco, has shown that rheumatism may be due to migration of germs from the tonsillar tissue. He has found the same micro-organisms in the synovial fluid of the knee-joint in two instances, and in the urine of nearly all his cases, as existed in their diseased tonsils, of which the clinical history proved they were quite free, prior to the attack of tonsillar disease.

These opinions would seem to be at variance with the somewhat prevalent one, of the existence of physiological, tonsillar phagocytosis.

DISEASES OF THE NASO-PHARYNX.

CHAPTER XXXVII.

NASO-PHARYNGEAL CATARRH.

THIS disease may appear in an acute or chronic form. It is somewhat rare, however, for it to fall into the hands of the physician in the acute stage. When it does, it is usually an extension of or accompaniment to acute rhinitis, as the disease is more likely to extend from before backward than from the lower pharynx to the vault above. When fortunately treated as an acute disease, it is attended by similar symptoms to those of acute rhinitis, and, being associated with it, is amenable to similar treatment.

The subacute, or chronic, form, however, requires distinct consideration.

Pathology.—In this disease there is thickened naso-pharyngeal mucosa affecting particularly the muciparous glands of the pharyngeal tonsil. Wherever these glands are clustered together in large numbers, there is a predisposition to chronic inflammatory disease and cell-desquamation. This is particularly so in the pharyngeal vault; and, whenever a proximate cause exists, a muco-purulent discharge from the evenly-distributed mass of glandular structures may be the result. This chronic inflammatory action is usually attended by more or less hyperplasia. Bosworth believes that the sac or cavity called Luschka's or Tornwaldt's bursa is not a natural condition, but the result of inflammatory action. By it, the two lateral lobes, into which the pharyngeal tonsil is sometimes divided, are swollen and crowded together, and the superficial layer of epithelium on the one side unites with the epithelial layer on the other, the interior being left open, thus forming the so-called bursa.

In these cases, as well as those in which the hyperplasia is more uniform and unattended by bursal development, the surface may assume a mammillated or raspberry-like contour. This lymph-tissue

is well supplied with blood-vessels, but with few acinous glands, and hence is differently formed than ordinary gland-tissue. It is supposed that the increased secretion, not having an acinous origin, must be formed in the sulci or fissures which separate the hypertrophied lobules from each other. When Tornwaldt's bursa exists, its lining membrane may also produce much of the discharge which occurs in this disease.

Etiology. -Meteorological changes in atmospheric conditions are frequently the exciting cause of this disease, particularly on the lower levels and along the water-ways. Throughout the extensive lake-region of North America this disease is very common. The cold, damp winds that prevail so extensively along the lakes during the changeable seasons of fall and spring, chilling the cutaneous surfaces, produce congestion of the naso-pharyngeal mucosa and lead to the chronic inflammation which exists so widely during these seasons of the year. Inhaled dust may also be a factor in some cases, but can only be of moment when the situation is dry and elevated and away from the lake-region.

In mountainous districts, however, and on the extensive inland prairies there may not be sufficient natural exosmosis from the turbinates to saturate the air as it is inspired. In these cases dry, dusty air may pass through the nares and strike against the post-pharyngeal wall, inducing chronic inflammation and catarrh.

The consequence is that these two causes alone, from their varied features of humidity and altitude, may produce two entirely different varieties of post-nasal catarrh: the one hypertrophic, the other atrophic. Or, in other words, the "moist" catarrh prevails with the lake-dwellers, while the "dry" catarrh holds sway upon the elevated plains.

The tendency among children to disease of lymphatic tissues would lead us to look for naso-pharyngeal catarrh most frequently in early life; Mouri says that it is even common among infants.

We are not sufficiently cognizant of the fact that unequal nasal breathing bears, in many instances, a direct relation to it also. In a large number of instances the comparative respiratory freedom of the two nostrils bears the relation of one to two or one to three. Whatever produces freedom of respiration in one nostril at the expense of the other tends to accumulation of secretion behind the stenosed region, and that accumulation results in disorganization of tissue and catarrhal disease.

Charles Knight has shown conclusively that exostosis of the sep-

tum is a frequent cause of chronic naso-pharyngeal disease. The bony projection is usually in the form of a somewhat irregular ridge running from before backward along the osseous septum, parallel with the floor of the nose. Sometimes it is even adherent to the inferior turbinated. Discharges are retained behind the obstruction, occasioning putrefaction and consequent increased irritation. While condemning officious operative treatment in all cases, the indications are clear to remove the obstructive lesion and by this means to produce efficient drainage.

In atrophic rhinitis naso-pharyngeal catarrh is always the result. The vault of the pharynx is in no way supplied with the venous sinuses of the turbinateds; so when the air, on account of turbinal atrophy, fails to reach the point of saturation in passing through the nasal passages, it quickly dries up the scanty secretion of the pharyngeal vault, leaving here the inspissated mucus, which it is so often difficult to remove.

This disease is said to be more prevalent in America than in Europe.

Another cause, particularly in our large cities, owes its origin to our supposed advanced civilization. Naso-pharyngeal catarrh among the aborigines of the various continents is almost an unknown quantity; but in our furnace-heated homes, with the intense dryness of the air, it is among the commonest of catarrhal affections.

Let a man wearing spectacles enter a house in the winter-time comfortably heated by stoves or fire-places, and immediately the moisture of the atmosphere will condense upon the glasses, and make vision through them impossible; and without he dries them, it will take several minutes before the glass will acquire the temperature of the room, and permit of drying by evaporation. Let the same man, on the other hand, enter a house heated by a hot-air furnace, and the glass will remain perfectly dry, inasmuch as the air contains too little moisture to permit of condensation.

The reason of this is that furnace manufacturers have too little knowledge of pneumatics and hydrostatics to build furnaces correctly. A water-pan for evaporation is supplied with each furnace; but it is usually altogether too small and too remote from the fire to be of material benefit. My own furnace is a case in point. It was constituted on the regular orthodox plan and the water-pan evaporated a pailful of water per day. But the air was so dry as to be distressing to the mucous membranes. This lasted one winter. The second season

I had the builder put in a large extra water-pan, right in the furnace-wall and above the coal chute. This evaporated nearly three times as much water per day as did the first one; and the two together made the house a great deal more comfortable. Of course, care had to be taken against too abrupt changes of temperature in furnishing the water-supply.

Symptomatology. The earliest symptom of naso-pharyngeal catarrh is the presence of something in the upper part of the throat, accompanied by a desire or impulse to remove it. The discharge which hawking brings away is of a more or less muco-purulent character, yellow in color, and tenacious in consistence. It is felt by the patient to be lodged behind the palate; and, when the disease is of long standing, quite frequently the most persistent efforts will fail to effect a complete removal.

One of the common symptoms is the so-called "dropping" which the patient feels in the throat. Of course, the term "dropping" is largely a misnomer. The discharge is often too thick and tenacious to drop. Another thing, it is not located so much upon the palate as on the post-pharyngeal wall; and it is the constant desire to swallow, which its presence produces, that gives rise to the mistaken idea.

In this disease the throat is easily fatigued. A feeling of constriction and even of aching is experienced. The discharge varies much in density. Sometimes it consists almost entirely of sero-pus and trickles down over the pharynx and off the palate easily. In others it is so tenacious that it cannot even be washed away, but requires the manipulation of a cotton holder to remove it.

Although the discharge may be constant, day and night, the movements of the pharynx, together with efforts to cleanse the throat, may keep the parts free by day-time, but during the long hours of sleep the deposit accumulates, to be removed with difficulty in the morning.

Sometimes the Eustachian cartilages are swollen and red, and the orifices of the tubes blocked by secretion. If this extends deeply into the tubes, catarrh of the middle ear and deafness may result.

In children, inflammatory thickening of the glands may induce adenoid disease, with mouth-breathing and all the other symptoms produced by nasal stenosis.

Perhaps no class of people feel the effects of this disease so severely as voice-users; and of these probably clergymen are the most numerous, as they speak for long periods at a stretch more regularly than any other class of speakers.

Diagnosis.—Although there is little difficulty in discovering the presence of a post-rhinal discharge, either in the oro-pharynx or naso-pharynx, yet there may be considerable difficulty in diagnosing the cause of its occurrence. To be sure that it is purely naso-pharyngeal, the exclusion of a nasal cause will be necessary. Many cases of pharyngeal discharge arise from nasal obstruction or lesion, even when the pharyngeal tonsil is hypertrophic; and, when atrophic rhinitis exists, the throat affection is, in nearly all cases, secondary. The same may be said of nasal polypus.

If, however, we can exclude the various affections of the nose, and find the glandular tissue in the throat coated with secretion, instead of being clear, moist, and of its natural pinkish-red color, the case is clearly one of pharyngeal origin. When Luschka's, or, as it is sometimes called, Tornwaldt's, bursitis has occurred, the discharge will be more purulent than in other varieties of the disease, and in the centre of the vault, above the prominence of the atlas, will be seen the projecting sac.

The possibility of mistaking syphilis of the naso-pharynx should be avoided by exclusion. In doubtful cases a course of specific treatment should be tried.

Prognosis.—When taken early and chronicity has not had time to be thoroughly established, it is usually amenable to treatment; but it is not a disease that has any tendency toward spontaneous cure. When it has been long in existence, and has become essentially chronic, although much can be done for it, positive and permanent cure need not be expected. In cases, however, when it is purely a secondary affection, the removal of the primary cause should always be followed by cure.

One difficulty the physician has to contend with in dealing with these cases is the general unwillingness of patients to submit to a long course of treatment for what they often consider a comparatively unimportant disease.

Treatment.—Whatever may have been the origin of the affection, or the predisposing cause which tended toward its development, it is essentially local in its manifestations. Hence the first object of treatment should be to secure perfect cleanliness of the parts affected. This can usually be accomplished by the use of certain alkaline washes. The temperature of the solution should always be about 100° F.

In order of merit the following will serve as illustrations:

1	R Sod. bicarb.	8
	Sod. bibor	8
	Acid carbol	2
	Glycerin	15
	Aquam	ad 300
	M.	
2	R Sod. chlorid	8
	Aquam	ad 300
	M.	
3	R Acidi borici	12
	Glycerin.	8
	Aquam	ad 300
	M.	
4	R Pot. chlor.	8
	Aquam bullient	300
	M.	

The best method of applying the solution is by the use of a post-nasal spray-syringe (Fig. 50). In using the instrument, after inserting the hard-rubber end behind the palate, the head should be bent forward over a bowl. Then the fluid is forced through the nasopharynx and the nasal passages, coming out, in great measure, through the anterior nares. By this method both the vault and the nasal fossæ are effectually cleansed. The position of the head referred to is important, when a continuous stream is thrown through the passages, as otherwise part of the fluid would find its way into the larynx. When, however, the interrupted flow is used, the bulb being filled separately each time, this precaution is not necessary.

This method of treatment should be followed twice a day at first. When improvement has become marked, the interval between treat-

1	R Sod. bicarb	3ij.
	Sod. bibor	3ij.
	Ac. carbol	. 3ss.
	Glycerin.	. . 3iv.
	Aquam	ad 3x.
	M.	
2	R Sod. chlorid	3ij.
	Aquam	ad 3x.
	M.	
3	R Acidi borici	3iij.
	Glycerin	3ij.
	Aquam	ad 3x.
	M.	
4	R Pot. chlor	3ij.
	Aquam bullient	3x.
	M.	

ments may be lengthened to suit the requirements of each case. If from acute sensitiveness of the parts the fluid used should prove to be too irritating, it could be weakened to half-strength or even less. In some cases during early treatments a weak solution of cocaine might require to be applied, but only under the doctor's supervision.

Sometimes even this vigorous treatment may not effectually remove the tenacious coating; and a curved cotton-holder, passed up behind the palate, guided by the post-rhinal mirror, may be required to mop it away.

Having thoroughly cleansed the naso-pharynx, stimulating and astringent treatment of the diseased mucosa is then required, and probably for this purpose no application is so useful as that of 10-per-cent. solution of nitrate of silver. It should be applied by means of a curved cotton-holder. It has an astringent effect upon the diseased surface-epithelium, and at the same time appears to check pus-cell proliferation.

The following tannin pigment has also a good effect applied in the same way:—

1. R	Acidi tannici	.....	1½
	Glycerin.	.....	3
	Aquam	.....	ad 30
M.			

Of sprays, after office-treatment, to be used by the patient, I have found nothing better than the following applied by atomizer through the nose, and in suitable cases into the post-nasal pharynx, by means of the curved tip, two or three times a day:—

2. R	Thymol	.....	2
	Menthol	.....	6
	Albolene	.....	60
M.			

Any of the following would also answer:—

1. R	Acidi tannici	.....	gr. xxij.
	Glycerin.	.....	℥ss.
	Aquam	.....	ad 3j.
M.			
2. R	Thymol	.....	gr. iij.
	Menthol	.....	gr. x.
	Albolene	.....	3ij.
M.			

1.	R	Eucalyptol	2	|	
		Menthol .....		|	5
		Albolene	60	|	
	M.				
2.	R	Creasote .....		|	6
		Ol. menth. pip. ....		|	6
		Albolene	60	|	
	M.				
3.	R	Formalin	4	|	
		Aquam	ad 60	|	
	M.				
4.	R	Hydrogen peroxide	12	|	
		Aquam	ad 60	|	
	M.				

When the naso-pharyngeal glands are enlarged, and continue secreting pus with little prospect of improvement, the removal or destruction of gland-tissue becomes necessary. To accomplish this various methods have been devised. Among the number is the use of the galvanocautery. This can be done, after applying a 15-per-cent. solution of cocaine, by passing the electrode directly backward through the nose, the operation being guided by the post-rhinal mirror. It can also be accomplished by the curved post-rhinal electrode, passed through the mouth and up behind the palate, guided, as before, by the use of the mirror. In the latter method the protection of the soft palate is an important consideration.

This can be accomplished in two ways: either by the use of a well-chosen palate-retractor or by the use of rubber cords passed through the nares and out through the mouth, the two ends being tied on each side over the lip.

Cases occur in which it is impossible even to examine the post-

1.	R	Eucalyptol	3ss.	
		Menthol	gr. viij.	
		Albolene	3ij.	
	M.			
2.	R	Creasote	mx.	
		Ol. menth. pip.	mx.	
		Albolene	3ij.	
	M.			
3.	R	Formalin	3j.	
		Aquam	ad 3ij.	
	M.			
4.	R	Hydrogen peroxide	3ij.	
		Aquam	ad 3ij.	
	M.			

pharynx without the use of a palate-retractor; but, fortunately, the majority of patients can be trained to control the palate-muscles sufficient for this purpose.

I believe, however, that the best method of removing these post-tonsillar enlargements is by the use of Gottstein's curettes. By two or three sweeps of the instrument the diseased tissue can be removed and a smooth surface left in its place.

Sometimes chromic acid is used as a caustic instead of the galvanocautery, but, like this instrument, it is likely to injure healthy tissue, except under the most careful manipulation. Both, too, are tedious, requiring a series of operations to effect the desired result.

As a distinct variety of naso-pharyngeal catarrh, the atrophic type might be mentioned. It is doubtful, however, if it ever occurs except as a result and continuation of atrophic rhinitis. It is produced by the same cause, and has essentially the same pathology, diagnosis, and prognosis. Left to itself, it is just as hopeless of amelioration or cure, while it demands, and is equally amenable to, a similar line of treatment—a speedy or positive cure being impossible, while amelioration of symptoms and a fair degree of comfort can always be obtained.

When Tornwaldt's disease or inflammation of the so-called pharyngeal bursa exists, free incision, with subsequent antiseptic treatment, will often be followed by a good result.

CHAPTER XXXVIII.

ADENOID GROWTHS OF THE NASO-PHARYNX.

POST-PHARYNGEAL adenoids are overgrowths or abnormal developments of the lymphoid tissues which exist naturally during early life in the naso-pharynx. Wilhelm Meyer was the first to study the history of these vegetations thoroughly; and he based his conclusions upon the personal and careful investigation of over one hundred cases. Numerous writers have written extensively upon the subject since Meyer's first paper appeared, but they have added, comparatively speaking, little to what he had already given us (Figs. 73 and 73a)



Fig. 73



Fig. 73a

Fig. 73 Infantile adenoids. Fig. 73a represents a growth quite common. (After Schadle)

Adenoid growths are found in the upper and back part of the naso-pharynx, on the site of the pharyngeal, or Luschka's, tonsil. The situation is between the orifices of the Eustachian tubes, but behind and above them. In some cases they grow so large as to press upon these tubes, even overlapping their orifices, and preventing the proper action of the tubal muscles (Fig. 74).

Pathology. — Between infantile and adult life, the pathological conditions of adenoid disease vary very much. In the former the surface of the adenoid enlargement presents a convoluted appearance, of

strawberry-like contour, the nodules standing out over the whole surface, except when Luschka's sac is present; then the central portion will exhibit a marked projection. In the latter the lymphatic cell-elements have given place, in some measure, to connective-tissue formation, and a denser and smoother development occupies the position of the original adenoid structure. In the transition-period of life the tonsillar hypertrophy will also indicate a blending of the two types. In young children to the touch it is almost like the softness of cerebral tissue.

Microscopically the surface is covered with columnar ciliated epithelium, but the cilia are frequently broken and bent and in some instances absent. Beneath this we have the myxomatous mucosa filled with lymph-corpuscles and the round lymph-follicles, separated from

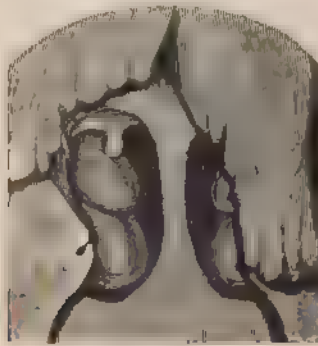


Fig. 74 Stalactite form. (After Schadle)

each other by interfollicular tracts (Fig. 75). It is essentially a lymphoid structure, copiously supplied with blood-vessels, the whole being arranged in the form of lobules (and secreting mucus or lymph from the crypts between the follicles). As the adenoid becomes old with increasing years, the lymph-tissues become absorbed, often shrinking away by the fifteenth or the twentieth year. In other instances hyperplasia takes the place of absorption, and fibrous connective tissue develops among the follicles and lobules of the adenoid.

The general impression, founded on clinical experience, is that the fibrous, connective-tissue element varies in direct ratio with the age of the patient. McBride, in his recent work, takes issue with this idea. Founding his opinion upon the examination of six hundred cases of adenoid disease, he says: "That while in many cases there is

a tendency to increase of the fibrous element at the expense of the cellular, yet it is a mistaken idea to believe that it tends to come on at any given age, and that it is more common in the very young child than in the adult."

Together with adenoid development, there are often, probably as an effort of extension, chains or clusters of enlarged follicles extending down the sides of the oro-pharynx, and situated behind the poste-

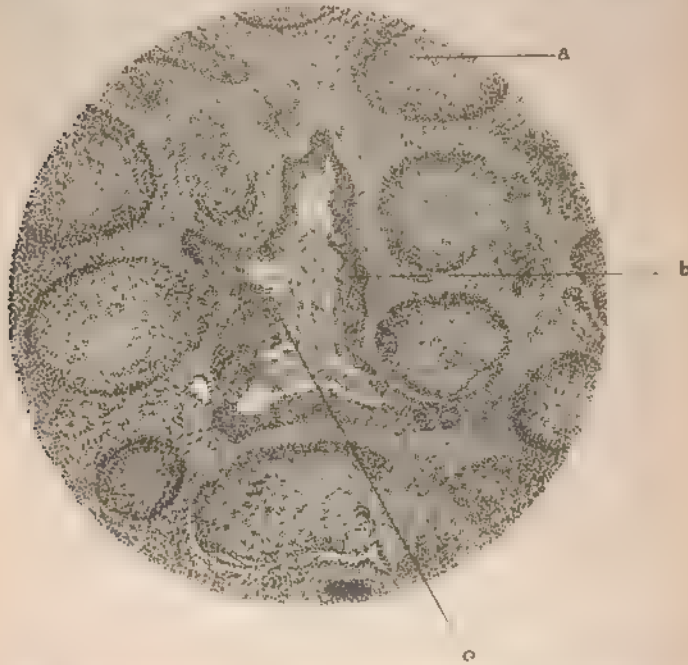


Fig. 75.—Microscopical section of hypertrophied pharyngeal tonsil with lymphoid infiltration (20 diameters). *a*, Lymphoid follicle. *b*, Stratified squamous epithelium of tonsillar crypt, infiltrated with lymphoid cells. *c*, Cavity of crypt filled with secretion and lymphoid cells. (Author's specimen by Bensley.)

rior pillars of the fauces, while single ones may be scattered here and there over the post-pharyngeal wall.

Etiology.—This is not believed to be a disease of early infantile life. Very few cases occur during the first two years. The exanthemata usually attack children after that age has been reached, and it is to the effects of those diseases that many cases can be traced. Bar-

rett and Webster, of Melbourne, believe that scarlet fever, measles, diphtheria, and whooping-cough bear a directly-causal relation to adenoid development, basing their theory upon the natural tendency to lymphoid development manifested by children about the period of the second dentition.

The largest percentage of cases occur between the ages of five and fifteen years.

Greville Macdonald's idea that one prominent cause in young children is the presence of anterior nasal stenosis, the effect being to lower barometric pressure in the naso-pharynx and to produce hyperæmia there, appears in America to be untenable. In my own experience, I have found nasal stenosis in young children *per se* exceedingly rare. Where I have seen it the cause has almost invariably been traumatic. Even where the nostrils have been blocked with mucus, adenoids being present, clearing the passages has revealed patent nostrils: quite sufficiently open, after the adenoids had been removed, to permit of normal respiration. Instead of obstruction and disease of the nasal passages being the cause of adenoid enlargement in young children, I believe the reverse to be the case, and that not infrequently both purulent and atrophic rhinitis owe their origin directly to the enlargement of the so-called Luschka tonsil.

Heredity is not without its influence in etiology, for frequently several members of the same family will successively apply for treatment for the same disease.

The comparative frequency in males and females varies little.

It is frequently associated with the presence of hypertrophied faucial tonsils, probably indicating the existence of a strumous diathesis, with a tendency to abnormal lymphoid development.

Symptomatology.—The symptoms may be divided into aural and general. Of the two classes, the aural are the most important. This importance lies in the fact that when aural symptoms do appear they indicate no little danger to a very important organ. In the language of Pyncheon, "Deaf-mutism is probably more often due to adenoid hypertrophy than to any other single cause, the hypertrophy having occurred before the child has learned to speak."

The first symptom of ear trouble is the presence of more or less deafness, caused by the closure or obstruction of the Eustachian tube. This may be followed by tinnitus aurium, otitis media, and abscess, resulting in perforation. Healing may then take place; but frequently chronic otitis media purulenta remains for weeks or months and even

years without healing, if the adenoids, the cause of the abscess, are not removed. When healing of the otitis does occur without adenoid operation, the continuance of pressure and the extension of catarrh to the Eustachian tube, produced by the ever-present hypertrophy, may lead to renewal of the inflammatory attack at any time.

If the development of the adenoids is uneven, the growth being in juxtaposition with one tube and not the other, it is quite possible for one-sided deafness to exist for years, and the hearing power to have diminished one-half, without having been discovered. The evil effect of the presence of adenoids upon hearing is chiefly produced in early life, although the stenosis and general shrinkage which occur in maturity may remove all interference with the Eustachian tubes; yet the evil may already have been accomplished, and the sense of hearing may have become permanently impaired. Still, many cases do occur in which ear-symptoms are never developed.

General Symptoms — In young children the most pronounced symptom is continuous mouth-breathing, with discharge of yellowish mucus from both anterior and posterior nares, the source of the secretion being chiefly the crypts and follicles of the hypertrophied adenoid tissue. The presence of the growth, together with the accumulated secretion, seriously interferes with nasal respiration. The child has neither the knowledge nor the ability to throw off the discharge, and it simply trickles away. When the pharyngeal tonsil is only moderately enlarged there is still room for nasal breathing during the day. The anterior nares may be free from secretion; but theropy mucus still presents itself in the throat, and on going to sleep the mouth drops open. The night passes with stertorous, disturbed breathing, accompanied by fretfulness and dreaming, and in the morning the little patient wakes up tired and unrefreshed.

One symptom which is always present, when stenosis occurs as a result of the obstruction, is what Meyer calls "the dead voice." The tone undergoes a change. The resonance of the voice is destroyed, by being cut off from the resonating chamber. Instead of what is commonly called the "nasal twang" being produced, it is abolished. The vocal waves are interfered with, and the proper voice is, in a sense, smothered, the power of correct singing being entirely destroyed.

When the nasal passages are free and the breathing normal, mastication and deglutition do not interfere in any way with respiration; but, when the naso-pharyngeal stenosis is severe, the act of eating becomes a distressing thing for the little sufferer.

External deformities of the face and chest are also the result of prolonged adenoid disease. Glentzmann has pointed out the influence of adenoids upon the development and configuration of the nasal septum and upper maxilla. Many facial deformities, he says, are produced by their interference with nasal respiration, such as high-arched palate, V-shaped upper maxilla, with the lateral teeth turned inwardly, and the molars outwardly. As a result, the upper jaw, being flattened, projects pointedly forward.

De Havilland Hall lays emphasis upon the amount of chest-deformity produced by defective nasal respiration. This in early life, he says, is almost always occasioned by the presence of adenoid vegetations.

The reflex influences of adenoid enlargements offer a wide field for investigation. Even over the voluntary movements of the young child their effects have been noticed. Lennox Browne and Bryson Delavan have each of them related the history of a case of masturbation in a young child troubled with adenoid disease; and in each case removal of the growth was followed, without any further interference, by cessation of the habit.

Headache is often the result of adenoid pressure; and instances of asthma, laryngeal cough, and hay fever have all been relieved by the removal of the growth.

Otto gives the history of a remarkable case of a young lady, aged 18, who was completely cured of enuresis nocturna by extirpation of a mass of adenoids located in her naso-pharynx.

One other point in reference to symptoms should be mentioned here. In the most severe cases of adenoid enlargement a condition termed aprosexia is frequently developed. In other words, the dullness and mental apathy indicated by the open mouth and unnatural expression of features has its counterpart in the mental condition of the patient. This is evidenced by irritability of temper, incapacity of concentration, and deficiency of memory. That the mental power of the brain is not itself injured, except by temporary suspension, is proved by the complete change of both facial expression and mental activity which follows the removal of the growths. The sulky and cross child with open mouth will be transformed into a bright and cheery one with closed lips and an aptitude for study previously unknown to it. The cause of this lack of mental grip is ascribed to the condition of lymphatic stagnation at the base of the brain. Quaipe draws attention to the numerous minute foramina communicating be-

tween the nasal passages and the cranial cavity, and that a similar mental condition is sometimes found in severe cases of nasal polypus.

Diagnosis.—The faucial symptoms, nasal stenosis, open mouth, flatness of voice, together with the early life of the patient are usually sufficient to produce a correct diagnosis without a rhinoscopic or digital examination. The use of the post-nasal mirror is often impossible in children; but examination of the pharynx by either sunlight or reflected light will often reveal a fullness of the palate or the region behind it diagnostic of the cause of obstruction. Digital examination behind the palate, however, will at once render the diagnosis possible. The soft, corrugated, brain-like tissue will be felt to present itself on the posterior and upper wall of the naso-pharynx: a condition which in early life could be produced by no other abnormal growth. Sometimes they may even descend into the oro-pharynx and be visible to direct examination.

When it is possible to obtain a post-rhinal view, a rounded or stalactite or flattened nodular tumor will be seen hanging down from the roof of the vault and projecting forward from its posterior surface (Fig. 73). Sometimes it hangs directly downward, hiding the upper part of the posterior nares from view (Fig. 74). When very large, the whole of the choanæ may be covered.

In adult life, when the growth is present, it will have lost its mammillated appearance,—at least, in a majority of instances. It is then more hyperplastic in character, the fibrous, connective-tissue elements having, in large measure, taken the place of the lymphoid and glandular. The consequence is that the tonsil is denser and firmer, with a smoother surface and containing fewer crevices and indentures.

Prognosis. In mild cases, insufficient to produce nasal stenosis and Eustachian obstruction, the prognosis even without treatment is favorable, as Nature favors absorption of the tonsillar hypertrophy, when puberty and adult life are reached.

In many cases requiring operative treatment the prognosis after removal is equally good, provided ear-lesions have not already occurred. Even when serious ear-complications do exist in young children, hope may be expressed of arresting the progressive deafness, together with expectation of a certain amount of improvement. When the ear disease has stopped short of necrosis, we may safely predict the arrest of chronic otitis media, both catarrhal and suppurative, at least in a majority of cases.

Recurrence of adenoids after removal rarely occurs. The text-

books speak very lightly upon the subject. Some even affirm that after thorough ablation they never return. Although this is the rule, still many instances have occurred in which, after thorough extirpation, there has been a redevelopment of the growth. Delavan, Wright, Butts, Meyer, and others have recorded cases; and Hopkins gives the history of three in which, after complete removal, adenoids developed again. I have personally attended two cases in which recurrence took place after what I believed to be thorough removal.

Although the operations for the removal of adenoids are usually attended with little danger, and at the same time productive of the best results, yet in some instances a fatal issue has followed the operation. Sanford reports the death of a child six hours afterward from convulsions; Mayo Collier reports a similar case. In both cocaine was the local anæsthetic used. Death was attributed in each case to nervous explosion.

Treatment. General treatment, so far as the regulation of the alimentary canal and the toning up of the system are concerned, is always advisable. At the same time it can have but little effect in controlling the development of the adenoid disease. Sprays and washes are also of little efficacy in severe cases, and their use is likewise usually resisted by the little sufferer. When the hypertrophy is not large, but just sufficient to produce a certain amount of catarrhal discharge, without much stenosis, this may be remedied by a slightly stimulating or astringent spray, of which the following is a good example. It should be thrown up behind the palate once or twice a day by an atomizer:

1. R	Acid. tannic	1
	Sod. bibor.	1
	Carbolic acid	3
	Glycerin	6
	Aquam	ad 60
	M	

The formula on the following page is another excellent spray for the same purpose, being antiseptic and slightly stimulating.

One part of this alcoholic solution should be added to 7 parts of an

1. R	Acid. tannic	gr. xv.
	Sod. bibor.	gr. xv.
	Carbolic acid	my.
	Glycerin	3iss.
	Aquam	ad 3ij.
	M	

aqueous 2-per-cent. solution of boric acid, and used with an atomizer to the nose and throat.

1. R Eucalyptol	|25
Ol gaulther	2
Menthol	1
Thymol	|3
Alcohol rect.	30

M.

When from one cause or another an atomizer cannot be used, the preparation already mentioned, of 1-per cent solution of menthol in albolene, could be snuffed up the nostril.

Any of these could be used two or three times a day.

When the adenoids are large, removal by surgical operation becomes necessary. This may be done by the use of hot or cold snares, galvanocautery-knife, cutting forceps, or curettes. It is impossible to completely destroy the sensibility of the parts by application of a local anæsthetic; but after childhood and during adult life it will rarely be necessary to administer a general anæsthetic, a 15- or 20-per-cent. solution of cocaine, applied by means of a cotton-holder, being all that should be required.

During infancy and early childhood the case is different; and my own impression is that an anæsthetic should always be administered. If the adenoids alone require to be removed, it need not be given to the extent of complete anæsthesia; but the operation can be performed so much more easily, rapidly, and painlessly under its influence that the advisability of its use can scarcely be questioned. The choice of the anæsthetic, however, is an exceedingly important matter, the safety of the patient being always of the highest consideration. Owing to the wide preference for ether, which has been displayed by surgeons for so many years for general surgical work, many are tempted to use it for throat-work also. There are serious objections to it, however. Not only is it believed to produce more bronchial congestion and pharyngeal hypersecretion than chloroform, and also, according to Lindemann, acute pulmonary œdema during or after the narcosis; but what is perhaps equally important is the fact that the vapor of ether is in-

1. R Eucalyptol	℥iv
Ol. gaulther	℥iij
Menthol	℥r. iss.
Thymol	gr. v
Alcohol rect	3j

M

flammable, and that it would be dangerous to use a cautery in any form to the nose or throat while using ether as an anæsthetic.

Bromide of ethyl has recently been received with great favor for these operations. Bishop considers it the anæsthetic *par excellence* for throat-work in children. The little patient is placed in a sitting posture on the assistant's lap, an ounce tube of bromide of ethyl is emptied into the air-tight inhaler and administered, allowing no air to enter. Anæsthesia is induced in about one minute and lasts about five. About one-half the bromide is taken and consciousness quickly returns. Nitrous oxide also during recent years has grown rapidly in favor as a safe anæsthetic. For short operations it is admirably suited, and its

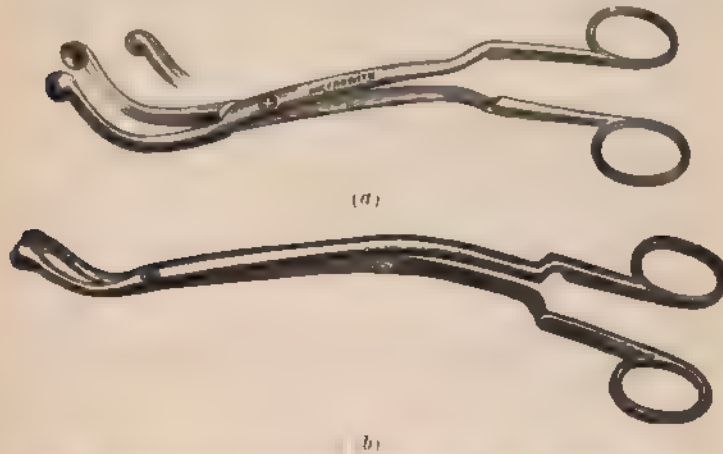


Fig 76. Gleitsmann's (a) and Löwenberg's (b) adenoid forceps.

effect can be prolonged by combining it with oxygen. Lennox Browne strongly favors its use.

The choice would seem to lie between bromide of ethyl and nitrous oxide. The comparative safety of the two it is too early to positively decide. One advantage of both of them, if advantage it is, lies in the fact that they can be administered in a sitting posture. As regards simplicity of management, however, chloroform would seem to have the advantage. A clean, coarse towel is all the instrument required, and the drug should always be given *per os* *quiescent*. Often a very little is needed and in a few moments the operation is all over. A few deaths have been recorded from its use in throat-work, out of the tens of thousands of times in which it has been given; but many

of these could be traced to careless administration; and we are not sure of the perfect safety of any anæsthetic that has ever been used.

The galvanecautery operation would be performed as already described in the chapter on "Naso-pharyngeal Catarrh," the mouth-gag being inserted and the palate retracted before the electrode is passed into the naso-pharynx. The child should be recumbent, with the head thrown back, the face being turned toward the operator and with sunlight playing upon the open pharynx. The position should be the same no matter what instrument is used in the operation, particularly if chloroform is the anæsthetic chosen. In using the cautery the sense of touch should be a sufficient guide for the instrument.

Snare, although used by some surgeons, are not generally considered satisfactory instruments for the removal of adenoids. When they are used, whether hot or cold, the snare may be passed through the nostril or up behind the palate, but it should be adjusted to the growth by the forefinger of the left hand (Figs. 34 to 37).

Many operators use post-pharyngeal cutting forceps, such as those of Lowenberg or Gleitsmann (Fig. 76 *a, b*), taking the adenoids away piece by piece. In some cases the whole operation is completed at one time. In others several operations are required before the adenoids can be entirely removed.

The most satisfactory instrument, however, and the one most extensively used by the profession at the present time, is Gottstein's curette. Of this there are various sizes and several modifications since Gottstein introduced the original design. It is a ring-instrument with the cutting edge so placed that in the downward movement it will lie in contact with the post-pharyngeal wall, excising completely all within its grasp (Fig. 77 *a, b, c, d*). In using it, although the mouth-gag is required, the palate-retractor is not. After anæsthesia in the upright posture—in the case of bromide of ethyl or nitrous oxide and in the recumbent in that of chloroform—the instrument is slipped up behind the palate, to the front of the adenoid growth. It is then pressed against the vault, and brought down with a sharp sweep, the shaft of the instrument being elevated toward the nose as the blade descends along the post-pharyngeal wall, the central part of the adenoid being swept away. It may be at once reinserted, first for one lateral portion and then for the other. To complete the operation and to avoid leaving any loose fragments of tissue, it is better to pass up the sterilized forefinger of one hand afterward and scrape the surface clean with the finger-nail.

In older patients the curettage can be done in the operating-chair under cocaine anæsthesia, and without the use of the mouth gag.

In my own experience, the large majority of my patients have been children between the ages of 4 and 10 or 12 years, and I have made it a rule to operate with the patient lying on the back with the head low, and invariably to have the anæsthetic administered by a qualified practitioner. In this class of cases I always operate digitally, using the nail of the forefinger of either hand, whichever at the time

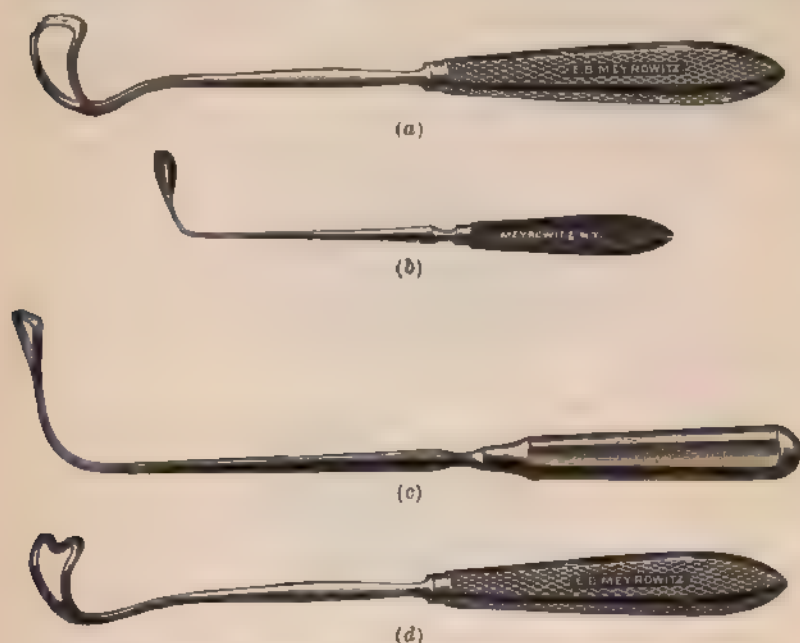


Fig. 77.—Adenoid curettes: (a) Gottstein's; (b) Bosworth's, rigid shank; (c) Payne's; (d) Munger's.

is the most convenient to use. The soft pulpy lymphoid tissue can easily be stripped off at a single operation; and the educated digit can apply itself more thoroughly and efficiently to the lateral regions, between the Eustachian tubes and the sides of the central promontory, than it would be possible to do at one sitting with the curette alone. When the tissue is too dense to be removed by the finger, the curette can be used to complete the operation.

The objection sometimes made to this method of operating, that

particles of adenoid tissue are likely to drop into the larynx, is, I believe, groundless. The recumbent posture with the head on the same level with the body, and with it turned somewhat toward the operator and thrown back during the operation, and the quick reversal to the side position to facilitate the hæmorrhage through the nasal passages into the bowl, will neutralize this tendency; and I have not seen a single instance in which I had the slightest reason to suspect its occurrence.

In older youths and adults, as said before, the operation is performed under cocaine anæsthesia and in the operating-chair, the instrument used being one form or other of Gottstein's curettes. It has usually in these cases required two or three operations to secure a perfectly satisfactory result. My use of post-nasal forceps has never been a success, although I have tried them variously modified in a number of instances.

The operation is always more or less painful, the cocaine never producing complete anæsthesia of the parts. Still, there is no doubt that it materially modifies the sensibility. Cleansing sprays for a few days after the operation are advisable; but they should not be commenced until thirty-six or forty-eight hours after the removal of the growth. The hydrocarbon oils containing $\frac{1}{2}$ to 1 per cent. of thymol or menthol are among the best for this purpose.

Sometimes, though rarely, severe hæmorrhage will follow the operation for the removal of the adenoids. In July of the present year Martin, of San Francisco, reported three cases of severe hæmorrhage after operation, though fortunately none of them were followed by death. Schmiegelow, one year ago, gave the history of a case by which the operation was followed immediately by a gush of arterial blood from the mouth and nose; and in a few minutes the boy was dead. Post-mortem examination proved that the internal carotid artery had been pushed out of position by swollen glands, and was opened by the curette. Several years earlier Newcombe reported two or three other cases, including one of his own, in which death occurred from general hæmorrhage from the vault. Fortunately these cases are very rare, though not infrequently severe bleeding will occur without resulting in a fatal issue.

CHAPTER XXXIX.

MYXOFIBROMA OF THE NASO-PHARYNX.

MYXOFIBROMA, or polypus, of the naso-pharynx is of comparatively rare occurrence. It is less myxomatous in character than when within the nose, and contains more fibrous connective tissue. Hence it must be considered a distinct variety of the disease. The surface is deeply congested, in contradistinction to the blue-gray of the nasal



Fig 78 Dr Grant's case of post nasal polypus.

polypus, while its freedom from pressure within the naso-pharynx enables it to attain a much larger size (Fig 78).

Pathology. The site of origin of polypus influences its pathological character. The ordinary mucous polypus has its origin usually along the summit of the middle meatus between the middle turbinated and the external wall, from a pure mucous membrane. As the mucosa descends downward over the body of the inferior turbinated and toward the post-rhinal choana, the fibrous, connective-tissue elements within it become more numerous. Hence, the polypus springing from the upper portion of one of the posterior nares, or the

junction of the nose and the naso-pharynx, is composed of a combination of both elements, the fibrous preponderating over the mucous. Like nasal polypus, the histological definition is that of loose fibroma, the external wall being of denser texture and more liberally supplied with blood-vessels. They do not always arise from the choana, however. Siethoff reports a case in which the tumor filled the whole of the post-nasal space, and the site of the attachment was the posterior end of the middle turbinated body. Microscopically it was an adenoid, connective-tissue growth, covered with stratified and ciliated epithelium. R. A. Reeve, of Toronto, also reports a peculiar case occurring in a man aged 20. The growth was long and evenly thick throughout, visible in the pharynx below the soft palate and attached to the summit of the vault. It was of a grayish-red color. Tentatively iodid. pot. was given in large doses for a week. By this time it had diminished in size; so that the drug was continued without operation, and in a few weeks complete absorption had taken place.

Etiology.—This is still, in a measure, an unknown quantity. It cannot be affirmed positively what the cause may be; but as the post-nasal polypus bears some relation to the ordinary myxoma of the nose, not infrequently occurring in the same individual, the causes may be identical. They are said to occur more frequently in females than males, and between the fifteenth and thirtieth years. They are usually single.

Symptomatology.—The principal symptoms are those caused by physical interference with respiration, vocalization, and deglutition. As it hangs down from one posterior naris, it occludes the passage on that side; and, the enlargement continuing, soon has the effect, by its pressure, of closing the other. Consequently respiration, of necessity, becomes oral, while vocal resonance incident to a normal condition of the nasal chambers is destroyed by the presence of the growth. Deglutition is interfered with, just to the extent that the movements of the palate are limited by the pressure of the polypus. Although there may be progressive discomfort, there is little pain. As the growth increases in size it may project below the palate and be visible in the pharynx. Like other nasal neoplasms, it occasionally produces reflex symptoms. Bosworth reports a case in his own practice in which spasmodic asthma was caused by the pressure of a post-nasal myxofibroma, and in which removal was followed by complete relief.

Diagnosis.—Posterior rhinoscopic examination should make the round, smooth, pinkish tumor visible. From adenoids it is distinguished by its site of origin, lighter color, and pear-shaped appearance; from fibroma, by more regularity of outline, less redness, and no tendency to hæmorrhage on being touched. Post-turbinal hypertrophy has a more corrugated surface, does not project far into the post-rhinal cavity and is always pale in color. Among the striking characteristics of post-nasal polypus are the facts that it is easily movable; and does not produce hæmorrhage, erosion, or facial deformity; nor does it possess that tendency to malignant development which true fibroma is supposed to do.

Prognosis.—While there is no probability of the tumor leading to a fatal issue, its removal by sloughing or absorption are not very promising. After complete removal, however, by operative measures they rarely recur.

Treatment.—Evulsion by strong serrated forceps through the mouth, when the tumor is sufficiently large to be grasped within the naso-pharynx, is one of the best methods of operation. A 15-per-cent. solution of cocaine should first be applied freely to the growth through the nose. This can be done by means of a cotton-carrier. Then, by grasping the tumor with the instrument, aided, if necessary, by the post-rhinal mirror, it can be drawn down to obtain freedom of motion, and twisted off its pedicle, care being taken not to use too much force in extraction.

In other cases, the nasal passages having been cleared and the tissues shrunken by cocaine, a snare may be passed through the nasal fossa and the wire adjusted to the pedicle by a finger passed within the naso-pharynx. This is a safe and in many cases an excellent method of extraction, particularly when the polypus is not very large, and may be done by either the cold-wire snare or galvanocautery-snare. The spring of the former, however, renders it much more adjustable, and, hence, it has a distinct preference over the pliable platinum wire. When the cold wire is used, the base of the growth should be cauterized afterward, and the same may be said after the forceps operation. In using the cautery-snare the Eustachian tube should be properly guarded.

Some writers recommend, in certain cases, incision into the soft palate, to increase the space and facilitate removal. With modern appliances for intranasal work, this should rarely, if ever, be necessary for removal of simple myxofibroma, however large. Under co-

came the growth can be taken away through the naso-pharynx without resorting to cutting operations into the normal tissue. Later experience has proved that in many cases the cold-wire snare passed up behind the palate is the best method of removal.

I have seen three cases. The first was a child aged 5 years. The pinkish, soft growth was visible hanging down behind the palate. Under chloroform I attempted to remove it with post-nasal forceps, but the attachment would slip from the grasp of the instrument. Failing this, I scraped it from the child's left posterior choana with the nail of the right forefinger. This occurred four years ago and there has been no return.

The second was in a man past middle life. The growth had formed from a large sessile base, and was attached to the upper part and on both sides of the posterior end of the septum. It partly filled both posterior nasal fossæ, and lay upon the upper surface of the soft palate. I found it impossible to pass the snare around it. The surface was smooth and glistening, and of a grayish-pink color. With the posterior rhinoscope slipped behind the growth, the base could be seen attached to the central part of both choanæ. With posterior nasal forceps part of it was removed. The galvanocautery-knife was then passed through the anterior nares, first on one side and then on the other, an incision being made in each case through the attachment close to the septum. Several days later, the attachment having loosened, the bulk of the growth was removed by the forceps from behind. The extended base was then singed by a curved electrode passed through the nares. Spray-treatment for cleansing purposes was subsequently used. Three years later, at the age of 60, there was no return.

R. A. Reeve, of Toronto, has reported another case of myxofibroma of the naso-pharynx. Unlike the one already referred to, this one had reached an immense size. It occurred in a woman aged 49. On examining the nose anteriorly something resembling myxomatous tissue seemed to fill the lower portion of both nasal fossæ. The masses, however, were not attached to the turbinates as they usually are in ordinary cases of nasal polypi. On examining the throat the growth was found to fill the whole naso-pharynx. In order to remove it, a vulsellum-forceps was bent to a suitable angle and the teeth blunted. The instrument was carefully passed up behind the palate and the body of the growth seized near its attachment to one of the posterior choanæ. With comparatively slight

traction the whole mass was removed in one piece. The projecting tentacles lying in the inferior meati were but overgrowths of a huge polypus, and slipped backward and out without severing their connection. On examination the attachment proved to be by a comparatively small pedicle, which was severed by the traction of the vulsellum. As a result, the patient received entire and permanent relief.

Since writing the above the following cases have been recorded:—

Weil (*Weiner medicinische Wochenschrift*, January, 1899) reports one case. It was attached all along the posterior edge of the vomer. Two hemispherical processes filled the naso-pharynx and caused complete nasal obstruction. One large branch of the polypus filled the right nasal cavity as far as the anterior naris, while a pear shaped portion, whose lower extremity could only be seen by strongly depressing the tongue, covered the whole post-pharyngeal wall. Weil removed it through the post-pharynx in one piece. Its weight was forty-five grammes.

Max Thorner (*Laryngoscope*, April, 1899) reports another, which was even larger. Hearing was much diminished, there was complete nasal stenosis, and the voice had the characteristic nasal twang. The left nasal fossa was free, but the right one, posteriorly, was filled with the mass. The attachment was at the posterior portion of the right nasal fossa. It was removed *en masse* by means of a cold-wire snare passed up behind the palate and around the growth. It was composed of many large and small nodules, some of them of the size of a small hen's egg. The pedicle was slender, not larger than a lead-pencil. The weight was fifty grammes. The patient was a man aged 30 years.

The author might likewise refer to one which he removed from the naso-pharynx of a woman aged 31, on April 24, 1899. The physician who brought this case for treatment had already removed a polypus from the left nostril. The probability, however, is that this was only a projection forward of the original growth into the naris from the naso-pharynx. On the left side there was complete stenosis. Post-nasal examination revealed a large lobulated, firm, and pinkish tumor, filling the post-nasal pharynx. A cold snare was passed up behind the soft palate, and was adjusted over the growth by the index finger of the left hand. The whole was removed in one mass. Although much smaller than the two already recorded, its weight was sixteen grammes.

The author would also like to make one remark, which so far he has not observed in reading up the literature upon this subject, and

that is: whenever a true fibroma oedematosa, or naso-pharyngeal polypus, is successfully removed, it is usually taken away in a single piece. It is difficult enough, and requires care and patience to adjust the snare well up around the body of the tumor; but it is next to impossible to press the wire closely upon all sides of the mass so as to grasp only the pedicle. Still, when the snare is tightened, it does not sever a piece, but removes the whole. The reason is obvious on examining the structure of the polypus. The body has often been years in growing, and is dense and fibrous and massive in character, while the pedicle is formed largely of blood-vessels and mucous membrane, and contains comparatively little fibrous tissue; and hence yields more readily to the traction placed upon it than does the body of the tumor.

CHAPTER XL.

FIBROMA OF THE NASO PHARYNX.

THIS disease differs materially from the one recorded in the previous chapter, being composed almost entirely of fibrous tissue and having its origin, many authorities say, from the base of the occipital bone, near its junction with the sphenoid, instead of in the choanal region. It differs, too, in its slow, steady, and relentless growth, crowding its way onward irrespective of the nature of the invaded tissue, and producing absorption of bone as well as other tissues if its way is impeded. With regard to origin, however, Capart says that in history of fifty cases he has usually found the tumor to arise from the internal surface and base of the pterygoid apophysis, and always on the right side.

Pathology.—These tumors always occur singly. The attachment is by a broad surface or pedicle, and sometimes the surface-attachment expands with the growth of the neoplasm. In color they are a dark red, though sometimes of a brighter or pinkish hue. They have a hard or dense texture, and at first a rounded form and smooth surface. The latter changes, and irregularity occurs as the disease advances. They are formed of close-grained, white, fibrous tissue plentifully supplied with blood-vessels. Scattered through the fibres, which often interlace, are found the arteries and veins, and around these are numbers of fusiform cells. The whole tumor is inclosed in a capsule derived from the mucous membrane. In addition to the vessels that permeate the growth, there are numerous blood-spaces, some of them lying directly below the outside coating of the fibrous neoplasm.

Etiology.—In Bishop's pithy words: "Their cause remains in obscurity." This is true in regard to many diseases. Notwithstanding the rapid progress medical science has made during recent years, we are still, in reference to etiology, groping in the dark; and how far bacteriological research will, in the near future, enable us to place this division of the science upon a sound basis yet remains to be seen. The majority of cases occur in males, and during the years of early maturity, the disease rarely commencing after the age of twenty-five

years. The surface blood-vessels of the growth are larger than those of the interior; hence the tendency to hæmorrhage from mere surface-abrasion.

Symptomatology.—The most prominent symptom, apart from those of nasal stenosis, which have already been more than once described, is that of frequently-recurring epistaxis arising from the bursting of some of the numerous venous spaces on the surface. This is possibly caused by friction with the soft palate. The amount of bleeding differs from a few drops to copious and even dangerous hæmorrhage. As the growth increases in size it will press the palate downward, often causing serious deformity. In the same way it may extend anteriorly into the nasal fossæ, displacing the nasal bones and producing deformity even of the face itself. There is usually considerable muco-purulent or muco-sanguineous discharge. The interference with nasal respiration and the pressure of the palate downward will affect deglutition and induce pharyngeal and laryngeal complications. The stenosis produced by naso-pharyngeal fibroma, although unilateral at first, soon becomes bilateral, gradually filling up the whole post-nasal cavity.

Diagnosis.—Post-rhinal examination should distinguish it from any other disease, even at an early date. Naso-pharyngeal fibroma is less regular in outline than myxofibroma and of a redder hue. The former is hard, the latter soft; it will also bleed on touching, while the naso-pharyngeal polypus will not. Beneath the reddish-pink surface of the fibroma the white fibrous tissue may sometimes be seen. While the tumor is hard to touch, it can easily be distinguished from the still-harder texture of osteoma. One other characteristic which distinguishes it from all other neoplasms, except those of a malignant character, is the tendency to oft-repeated hæmorrhage.

The points of difference between fibroma and the malignant diseases, sarcoma and carcinoma, will be dwelt upon when dealing with these subjects.

Prognosis.—If unremoved by operative measures the tendency is toward a fatal result, partly owing to the repeated hæmorrhages which so frequently occur. These growths, however, rarely develop after puberty; and, that age being reached without a fatal issue, development may sometimes be arrested and gradual shrinkage of the tumor ensue. Several cases have been recorded in which this has occurred. Still, it is not wise to postpone treatment with the hope of such an issue, for, if unarrested, the surrounding structures, no

matter how vital their character, are likely to be invaded by the disease.

Treatment.—These growths should invariably be removed, if there is any prospect of this being accomplished without incurring risk of life. When at all possible, too, the operation should be performed *per vias naturales*. There are few instances requiring the radical method, proposed by some writers, of removing the upper maxilla. If necessary, it would be better to divide the soft palate in order to reach the base of the growth. The palate is not affected except by pressure, having no attachment to the tumor itself.

Operation by galvanocautery-écraseur is considered one of the best methods now adapted, as by the slow action of the cautery hæmorrhage may be prevented. After passing the snare through the nasal fossa the platinum wire is adjusted to the base of the growth in the vault by the finger. Then the wire is drawn so as to grasp the tissue, and the electric current turned on at a red heat, and slowly tightened until the growth is excised. This operation is easy to describe, but difficult to accomplish, especially with the instruments that are now in use. The platinum wire, when drawn tightly, will often break, particularly when at a dull-red heat, and the part to which it has to be adjusted is difficult to manipulate with so soft a wire.

Still, 14 cases are reported by Lincoln as treated in this way. Of these, 11 were cured, while in the other 3 recurrence took place; whereas in 38 operations in which the superior maxilla was resected 10 were cured, 8 died from the operation, 11 recurred, and 9 were incomplete. In 7 operated on through the palate 2 recovered, 2 recurred, 1 died, and 2 were incomplete.

In some cases, where the galvano-écraseur is unavailable or does the work incompletely, the galvanocautery-knife may do better service. It will require great care in manipulation to prevent hæmorrhage.

Operations by cutting forceps and the curettes in the early stages have been tried, but the same care against excessive bleeding requires to be taken.

Bosworth prefers the cold steel-wire snare, applied in the same way, the instrument being a stronger one than those ordinarily in use and made of the Jarvis type, with a bar to tighten the screw instead of a wheel.

Capart and Ingals favor electrolysis in the treatment of this dis-

ease. It has the advantage over all others of being unattended by hæmorrhage, and when the parts are freely cocainized it is not very painful. It may be practiced either by the bipolar or monopolar method. In the former the positive and negative needles, properly protected, are passed side by side directly into the tumor at the distance of half a centimetre from each other. This can be done either through the cocainized nasal fossa or by curved needles into the growth from behind the palate. The current should be between 15 and 25 milliamperes and the time at each sitting ten to twenty minutes. By the monopolar method, the right pole might be a large flat electrode applied to the cervical spine, and the left pole a needle inserted into the tissue as before. The number of treatments required would vary materially, some requiring a large number and others comparatively few. When the electrolysis is not destructive of the tumor, it may have a contracting effect upon the calibre of the blood-vessels, thus limiting the arterial supply and rendering subsequent radical operation less dangerous. The frequency of treatment would be every two or three days.

Whatever plan is followed, the parts can be kept as aseptic as possible by the use of cleansing, antiseptic sprays.

CHAPTER XLI.

MALIGNANT DISEASES OF THE NASO-PHARYNX: SARCOMA AND CARCINOMA.

SARCOMA.

MALIGNANT diseases of this region are very rare, but of the two—sarcoma and carcinoma—sarcoma is much more frequent.

Pathology.—The origin of sarcoma of the naso-pharynx, like fibroma, is usually from the neighborhood of the union of the basilar process of the occipital bone with the sphenoid. The tumor is more sessile in its attachment than fibroma. It starts in the deeper layers of the mucosa, and, while the base is expanding, the growth develops downward, with a lobular surface, rapidly filling the post-pharynx, and sometimes extending forward through the post-nares into the nasal cavities. Histologically it presents the usual characteristic features of sarcoma, with large and small round cells and dense fibrous connective tissue. The growths are of softer texture than fibroma, and, hence, are less likely to displace the dense osseous tissues.

Etiology.—The bacillus of sarcoma has so far not been discovered, but it is more than probable that it is, in all cases, of bacillary origin. It usually occurs in early life, in this way differing from the rarer disease, carcinoma. Still, it does occur occasionally even in extreme age. It is more frequent in males than females.

Symptomatology.—In the early stages the symptoms do not differ materially from those of the diseases already described which impede nasal breathing. There is, however, somewhat early in its history a characteristic discharge of offensive malodorous sero-pus. Hæmorrhage sometimes occurs, though less frequently and less severely than in the milder disease, fibroma. The general health likewise suffers. When the sarcoma grows large, it interferes with the normal condition of the adjacent organs, pressure on the Eustachian tubes producing deafness to a more or less degree, and invasion of the pharynx inducing difficult deglutition and vocalization. Shooting pains to the ears sometimes occur.

Diagnosis.—Sarcoma of the naso-pharynx is to be distinguished from carcinoma, fibroma, tuberculosis, and tertiary syphilis. Its soft, grayish, pultaceous appearance should distinguish it from the harder

and pinker fibroma. From carcinoma, the age of the patient should help in the diagnosis. The exceeding rarity of carcinoma, also, together with its more marked cachexia and greater tendency to be associated with glandular enlargement, should help in this matter. As to tuberculosis and syphilis, the general constitutional symptoms and personal history should materially aid in forming a correct conclusion.

Prognosis.—The younger the patient, the more rapid the progress of the disease. This is never toward resolution, but always toward a fatal issue. Small-celled sarcoma is said to be more rapidly fatal than the large round-celled or the spindle-celled varieties. Fibrosarcoma, which is merely a combination of the fibrous with the malignant disease, is slower in development, although more likely to be attended during its course by attacks of severe hæmorrhage. Even after successful removal by operations, in the majority of instances, recurrence takes place, a very small percentage of recoveries having been recorded, while a large number of patients have died on the operating-table.

Treatment.—As a rule, palliative measures, with mild cleansing washes to the parts affected, are the only justifiable means of treatment. The general system should be supported by tonics and good digestible food, while hygienic conditions should be carefully attended to.

The results of operative treatment are usually very unfavorable. The old method of splitting the palate and dissecting out the growth; and the larger one, of removing a portion of the upper maxilla, to get at the pedicle of the disease, have been attended almost uniformly by a fatal result. Bryson Delavan, however, reports a case which seems to be an exception. After the sarcoma had developed, until it partly filled the naso-pharynx, and almost entirely the left nasal cavity, electrolysis was resorted to and carried on for a year. Under its use, hæmorrhage ceased, the growth shrank, and health improved. By that time it lost its efficacy, and operation was performed, removing the growth as thoroughly as possible. Recurrence was soon very marked, and operation was again performed. This time the upper part of the left superior maxilla was removed, and the growth found to be attached to the sphenoid sinus. It was excised thoroughly. An opening was left in the hard palate by which the site could be watched. It recurred slightly several times and was each time burned away with galvanocautery. On recording this case

four months had elapsed without any return, and the youth, aged 17, was well.

Bosworth reports a case cured in a gentleman aged 42. This was done by repeated snaring of small portions of the growth, carried on daily for several weeks, and followed by a series of galvanocautery operations, conducted in like manner. After a time the sarcoma was entirely removed, and seven years later there had been no return.

Logan, in 1894, reported a somewhat similar case. In this a number of snare operations had been performed, but all were followed by rapid recurrence of the disease. Finally the case fell into his hands. He tied the palate forward and found the growth attached to the roof of the naso-pharynx. He divided the growth into several sections and removed each section by a galvanocautery operation. Six years later the sarcoma had not returned and the man was in perfect health.

In all these cases microscopical examinations proved the correctness of the diagnosis.

In Bosworth's case as well as Logan's it will be noticed that the final successful work was done by the galvanocautery: a clear indication of the value of this instrument in dealing with malignant disease.

If the tumor is taken early, and can be removed piece by piece by means of the galvanocautery, which can be so controlled as to occasion but little hæmorrhage, we are certainly justified in making the attempt. By this means we also save the possibility of autoinfection, which might occur through knife operation upon unaffected tissues.

CARCINOMA

The literature upon this subject is confined to the history of a few reported cases. The disease resembles sarcoma in many ways, and is so invariably fatal that little need be said of it here. Rare as is sarcoma, carcinoma, the more malignant of the two, is still more rare. A few important points are worthy of notice, however: It is a disease that almost always occurs late in life. Unlike sarcoma, it is also attended by profuse glandular enlargement and a general appearance of malignant cachexia. Microscopically the presence of epithelial cells distinguish it from sarcoma.

The prognosis is uniformly unfavorable. Operative treatment is useless, mild cleansing and supporting measures being all that can be of any avail. Opiates internally and the local application of cocaine may, in the latter stages, afford a certain measure of relief.

CHONDROMA OF THE NASO-PHARYNX.

This non-malignant disease is so exceedingly rare that only mere mention of it will be necessary. The symptoms are those of ordinary stenosis. There may also be occasional attacks of headache and also of syncope. Post-nasal examination reveals the presence of a hard, dense, whitish growth. Microscopical examination of segments show the cartilaginous character of the neoplasm. There is no tendency to malignancy. Surgical operation will be required for removal. There should be no return of the disease.

FOREIGN BODIES.

Sometimes, though rarely, foreign bodies become lodged in the naso-pharynx. Although they produce symptoms, they may remain for years before they are discovered. The two following are interesting cases and worthy of note: -

R. Patterson (*Journal of Laryngology*, May, 1899) reports a foreign body impacted in the naso-pharynx for four years. This was a metal regulator of an infant's feeding-bottle. It was removed from a child, aged 6 years, suffering from otorrhœa of the left side, with fœtid discharge from left nostril. There was also complete nasal stenosis, and something could be distinguished in the post-pharynx on looking through the left nasal passage. Under anæsthesia a hard mass was discovered and removed from the naso-pharynx, and was found to be the body mentioned, thickly coated with phosphates.

The history obtained was that, when the child was fifteen months old, while playing with a regulator it suddenly showed difficulty of breathing. This was relieved by suspending the head downward. From that time nasal breathing became obstructed, and the child's health suffered. At various times subsequently bougies had been passed into the œsophagus by medical men, to prove to the parents that the foreign body was not still in the throat.

H. S. Birkett (*Montreal Medical Journal*, June, 1899) reports a foreign body in the naso-pharynx for eighteen years and gives the history of this peculiar case. It occurred in a woman aged 23 years. She had had profuse muco-purulent discharge from both nostrils for many years. The odor was characteristic of a foreign body.

When five years old she accidentally slipped a thimble into her throat. This was followed by a violent fit of coughing, which suddenly ceased upon her being thumped upon the back.

DISEASES OF THE ORO-PHARYNX.

CHAPTER XLII.

ACUTE PHARYNGITIS.

ACUTE sore throat, the common name of this disease, is of frequent occurrence. It affects the whole faucial region, including the soft palate, with the uvula, faucial pillars, and tonsils. The spot first attacked, and from which it spreads to the surrounding tissues, varies in different cases. In persons subject to the disease, the plan of attack and extension often follows an almost invariable course.

One patient will always feel at the onset an uncomfortable pricking soreness in the one tonsil, from which it will extend to the whole pharyngeal cavity. Another will perceive the first symptoms on the back wall of the pharynx, while a third will declare that the primary irritation is always felt in the back part of the nostrils or the post-nasal space. Still another will state positively that, while the acute cold will always commence in the throat, it invariably extends upward to the nose before it disappears.

Pathology.—The mucous membrane of the fauces is but scantily supplied with glands. Consequently in the first stage of acute inflammation the squamous epithelial lining shows marked hyperæmia, accompanied with arrest of secretion and dryness of the surface. The condition may last twenty-four hours or so, and is followed by exosmosis of serum and intermixture of muco-pus and epithelial cells. Micrococci are present in large numbers, of which streptococci in many cases predominate.

Etiology.—While sudden exposure to a greatly lowered temperature, particularly when that exposure is confined to certain parts of the body, will often be the immediate cause, yet it is pretty generally conceded that this rarely occurs without the presence of a prior or latent cause for the production of the disease. So many people are exposed in a similar manner without acquiring acute pharyngitis that we are forced to believe in a special tendency toward its development in the case of those who habitually become victims.

Whether that tendency is produced by the constant presence of

chronic faucial disease, tonsillar hyperplasia, naso-pharyngeal stenosis, general dyscrasia, or deranged digestion or not, one of these, at all events, becomes in many instances a potent factor in the etiology, and if possible should be removed.

The attack may be brought on by exposure of the back of the neck or chest to a cold wind, particularly when the system is overheated or perspiring. In the same way, sudden changes of undergarments from heavy to light, without due regard to atmospheric temperature, may chill the surface and increase the blood pressure in a weakened pharyngeal mucous membrane. The disease is often caused by a vitiated atmosphere, inhaled by persons employed in overheated, ill-ventilated rooms. These unfortunates frequently become the victims.

It is more apt to occur in adult life than among children, as in the latter the lymphatic and glandular elements are more prone to inflammatory action than are the connective-tissue structures.

Symptomatology. Slight chilliness and general malaise, accompanied by a sense of discomfort and soreness of throat, are usually the first symptoms. The rise in temperature is slight, rarely more than one or two degrees. Frontal headache is sometimes present, and when the inflammation extends to the Eustachian tubes, producing temporary stenosis, there may be ringing or deafness.

For the first hours the throat will feel dry and irritable, and on inspection will reveal an hyperæmic condition, with diffused redness pervading all the visible parts of the pharynx. After this the blood-vessels and small glands commence to relieve themselves, by pouring out upon the surface a copious effusion of sero-mucus; pus-corpuscles may also develop, and the inflamed pharynx, coated with secretion, may in some places be almost hidden from view, particularly when the vault is involved.

In some cases considerable œdema of the soft palate takes place, and the mucous membrane of the mouth and tongue become flabby and heavily coated and the breath itself unpleasant. When the inflammatory condition extends downward to the larynx, an irritable cough is induced. This, although it occurs comparatively early in the disease, rarely extends to the bronchial tubes.

The duration of acute pharyngitis may be from two or three days to a week. By prompt treatment it can often be shortened and the temperature reduced to the normal, followed by rapid disappearance of symptoms.

Diagnosis.—Sore throats occur in connection with exanthematous diseases, and in these cases the diagnosis may not be certain until the surface eruption appears. Still, close examination should distinguish the even hyperæmia of simple sore throat from the submucous efflorescence of the eruptive fevers. In commencing tonsillitis the pain of the tonsil affected is more severe than in simple acute pharyngitis, while the redness of the surrounding mucosa is less evenly distributed. In rheumatic sore throat there is usually less œdema than in the second stage of this disease, while the faucial muscles are more painful.

Prognosis.—Unless the inflammatory action extends to the larynx, it usually subsides within a week. Some writers have reported cases followed by systemic paralysis, but it is doubtful whether the toxic effect of the disease could be severe enough to produce paresis. Other writers believe that these must have been cases of masked diphtheria, in which the Klebs-Loeffler bacillus, although present, could not be found.

Treatment.—Before entering upon the treatment of acute pharyngitis a word or two might be said here in reference to eucaine, introduced a couple of years ago as a collateral drug which might in some cases take the place of cocaine in the treatment of nose and throat diseases. I have not spoken of eucaine before, because from the writings of authors and my own personal experience I did not think it could be used with advantage in nasal work, and in this field would be far inferior in utility to cocaine as a local anæsthetic. In the pharynx, where we have ample space for vision, and do not require to contract the tissues in order to obtain a view, the case may be different, and I will here give the views of several leading writers upon the comparative merits of the two drugs.

Somers (*Therapeutic Gazette*) says cocaine produces local anæsthesia in from 3 to 5 minutes, lasting from 20 to 30 minutes; eucaine produces local anæsthesia in from 8 to 10 minutes lasting only 20 minutes. Cocaine produces anæmia of mucous membrane. Eucaine produces hyperæmia. This action of eucaine, he says, strongly militates against its use in operations upon hypertrophic tissues. The advantages, however, which it has over cocaine are the following: It produces less pharyngeal disturbance, is less harmful to the system, keeps better in solution, and the efficiency of the drug is not injured by boiling.

Pouchet (*La Semaine Médicale*), reporting to the Société Thera-

peutique, said that he had investigated the physiological action of eucaïne. He found the toxic equivalent almost equal to that of cocaine. He says eucaïne may produce toxic effects, which may even prove fatal without any prodromic stage. Its action on the heart is as intense as that of cocaine. Eucaïne must therefore be looked upon as a dangerous drug.

Réclus (*British Medical Journal Epitome*) says that in equal doses its anæsthetic power is less than that of cocaine. He thinks, therefore, that it should not be used in serious operations.

J. S. Gibb (*Philadelphia Polyclinic*) has used eucaïne in diseases of nose and throat, and sums up as follows: 1. Eucaïne is equally efficient with cocaine as an anæsthetic in ordinary examinations. 2. It possesses equal anæsthetic power with cocaine, and hence is as useful in operations on nose, throat, and larynx. 3. Eucaïne is nearly if not quite as effective as cocaine in reducing the engorged turbinated bodies. 4. Eucaïne is superior to cocaine, in that it is less likely to produce toxic symptoms and also unpleasant subjective symptoms, particularly as regards the pharynx.

Lastly, Jobson Horne and MacLeod Yearsly (*British Medical Journal*), after a long article upon the subject, close with the following statement: "Several points remain for further experience to decide, but we consider that our results, so far, justify us in continuing the investigation. Eucaïne cannot, however, wholly replace cocaine, since the effect of the latter, in reducing the size of the turbinated bodies, gives it a value as an aid to diagnosis which eucaïne does not appear to possess."

These combined remarks seemingly would justify our exclusion of eucaïne in dealing with diseases of the nose; while they indicate a probable utility in regard to the treatment of pharyngeal disease.

To return to the treatment of acute pharyngitis. Much can be done in the way of abortive treatment in the physician's office. It can frequently be arrested by prompt local treatment. First, cleanse the pharynx with a spray of Dobell's solution. Then spray it at once with a 2-per-cent. solution of cocaine. Possibly a similar solution of eucaïne would answer equally as well. This will, in a few moments, deaden the terminal nerve-filaments and prepare the mucous membrane for the important part of the treatment, which is simply to brush the pharynx with a 5-per-cent. solution of nitrate of silver, applying the pigment most thoroughly upon the parts affected. The treatment is to be repeated in twenty-four hours if required. In the

meantime, and subsequent to the brushing, either of the following solutions, applied with an atomizer every three or four hours, will act as an antiseptic to the throat and aid in keeping it clear of catarrhal secretions:—

1. R Resorcin 1|2
 Glycerin 6|
 Aquamad 60|
 M.
2. R Thymol |065
 Boric acid 2|
 Glycerin 3|
 Aquamad 60|
 M.

Although by this method slightly increased tenderness of the throat may be experienced, as soon as the effect of the cocaine or eucaine has passed away, yet the course of the disease will be shortened. In a day or two the increased redness of the mucous membrane will have disappeared, and, instead of the pultaceous infiltration and muco-purulent discharge that sometimes occurs, it will have resumed an almost normal appearance.

To accomplish the same object in a different way Bishop advises the administration of pellets each containing $\frac{1}{6}$ milligramme³ of atropia and 8 milligrammes⁴ of morphia, repeated every few hours as required, to act by their combined anodyne and drying effect upon the mucous membrane.

Quinine might be administered in either case and a brisk cathartic if required.

Among the older methods of treatment, one that has often been very effective in checking the disease is the giving of drop doses of tincture of aconite every hour until the throat symptoms commence to abate, after which the interval should be lengthened. This would

-
1. R Resorcingr. xvij.
 Glycerin3iss.
 Aquamad 3ij.
 M.
 2. R Thymolgr. j.
 Boric acidgr. xxx.
 Glycerinmxxlv.
 Aquamad 3ij.
 M.

³ $\frac{1}{400}$ grain. ⁴ $\frac{1}{8}$ grain.

usually occur before the first twenty-four doses had been given. Tincture of belladonna might be prescribed in the same way, in 3-drop doses every two hours. Both are arterial sedatives, with an astringent effect upon the fauces.

Gargles of alkaline solutions, such as Dobell's, chlorate of potassa, etc., have long been advised in the treatment of this disease. Gargles are, however, as a rule, only imperfectly applied, the solution not being allowed to enter the lower pharynx at all. Consequently, even when using the same solution, a good atomizer is much to be preferred.

If the improvement seems tardy, the alkaline spray might be followed by an astringent, my own preference being for the hydrocarbon compound, used, of course, with an atomizer.

1. R Acid. tannic. 2j
Glycerin 3
Aquam ad 60j
M.
2. R Thymol 13
Menthol 13
Albolene 60j
M.

As regards external applications to the neck, I do not believe they are of much value. Sometimes a cold wet flannel applied to the front of the throat, and kept in position by a rubber bandage around the neck, will reduce the irritation by its sedative effect. When counter-irritation is needed, equal parts of spirit of turpentine and sweet oil form a good application, the throat being covered with a layer of cotton-wool.

As said before, persons subject to this disease are frequently sufferers from some obstructive lesion, which is the primary cause. Hence, after recovery, it is the duty of the physician to see to it that the lesion if present be removed, and that the entire naso-pharyngeal mucosa be placed in as sound a condition as possible.

-
1. R Acid tannic gr. xxx
Glycerin mxxlv.
Aquam ad 5ij
M.
 2. R Thymol gr. ij.
Menthol gr. xx.
Albolene 5ij.
M.

CHAPTER XLIII.

CHRONIC PHARYNGITIS.

THIS disease is confined largely to the pharyngeal mucous membrane, the soft palate and the uvula being rarely affected, except in cases which have a nasal origin. As it occurs chiefly in adult life, the glandular system is but little affected. The tonsils, however, if in an hyperplastic condition, not infrequently become affected by the disease.

Pathology.—Successive repetition of attacks of sore throat, from whatever cause, is likely to produce permanent hyperæmia and relaxation of the blood-vessels. A species of pharyngeal paresis takes place—the continued congestion resulting in surface-infiltration and structural thickening of the mucosa. The lymph-follicles and muciparous glands are also affected, sometimes being marked by distinct hypertrophy in the lines of the salpingo-pharyngeal folds.

Etiology.—There are many causes for this disease, and writers in tracing out the etiology are apt to be influenced by special features coming under their personal observation. In my own experience, chronic nasal disease, deviations of the septum, the presence of neoplasms, or post-nasal adenoids have been the prevailing causes. The result of any of these would be oral breathing, particularly at night, and the direct contact, repeated every night for a prolonged period, of dry air upon the post-pharynx, for reasons already explained, would be sufficient to induce the disease.

Some writers believe that the most common cause is the occurrence of the oft-repeated attacks of acute pharyngitis, while others assert that this is never the cause, but that the chronic disease is the etiological factor of the acute.

Bosworth traces the disease to chronic gastritis of one form or another, basing the belief on the theory that the oro-pharynx is a part of the food-tract, and consequently more in sympathy, physiologically and pathologically, with the digestive than the respiratory organs. Gastric disturbances of a chronic character almost invariably affect the pharynx, possibly by reflex influence. This is particularly the case in chronic alcoholism. The tobacco habit, too, is not unattended

by evil results, though whether they arise from nicotine absorption or the direct effect of the hot, dry air upon the throat is still an undecided question. Persons whose occupations keep them exposed to constant respiration of foul air or irritating gases are also subject to the disease. It is also frequently caused by improper or prolonged use of the voice.

Symptomatology.—A sensation of throat discomfort, accompanied by a desire to swallow, in order to relieve the parts of supposed accumulations, is one of the commonest symptoms, particularly when the disease has a nasal origin. When it arises from chronic gastric disturbance, the throat is more irritable, and on examination with the tongue-depressor retching may be produced, while the raw, inflamed condition of the lower pharynx will be observed. The voice, too, is often altered in tone. There may be a rasping screatus to clear the lower pharynx, and a jerky hoarseness, sometimes lapsing momentarily into aphonia. A voluntary cough to free the arytenoids from mucus may be present. In certain cases the palate becomes relaxed, hanging down like a flabby curtain, and even the uvula may become oedematous and elongated, though these conditions can only occur, I believe, when the primary cause lies in the upper air-passages.

Diagnosis.—The symptoms described, together with the sensations experienced by the patient, should easily distinguish this from any other disease. The chief difficulty in diagnosis should not be as to existence of chronic pharyngitis, but as to the cause which produced it, whether it arose from gastric or nasal disturbance or from some purely external source. One broad distinction lies between the first two. In the former the lower throat will be deeply congested and the tongue will be irritable, with red papillæ standing over its base, the palate being but slightly affected. In the latter the redness and irritability will be slighter, the post-pharynx be more deeply coated, and the palate affected more or less by the disease. When both these causes can be excluded, the history of the case *per se* may indicate the origin.

Prognosis.—This is not an alarming disease; but, as the cause producing it is usually of a chronic character, both chronic conditions require to be removed, and it may take careful treatment for a long time to accomplish the end in view. Still, much relief even from the commencement can be given, and it is worth the patient's while to submit to the necessary treatment.

Treatment. When the disease is secondary it becomes important,

if possible, to remove the primary cause, whether that be by surgical removal of obstructive lesions of nose or naso-pharynx or systemic treatment of chronic gastric disease. It may be necessary to break or check the liquor habit or to interdict the use of tobacco. Difficult as either of the latter may seem to be, the patient who appreciates the throat affection sufficiently to seek professional relief will usually do his best to carry out the physician's advice.

Direct treatment to the throat will also be required. The first should be thorough cleansing with alkaline sprays. If there is much thickening and infiltration of the mucosa, this should be followed by the application of a 10-per-cent. solution of nitrate of silver. The best way of applying it is by means of a cotton-holder. Sometimes the throat is so irritable that the pressure of the tongue-depressor upon the back of the tongue will immediately produce contraction of the pillars, shutting off almost the whole of the post-pharyngeal wall from view. To obviate this a weak solution of cocaine, 1 or 2 per cent., may be applied to the fauces. Then, in applying the silver solution, the end of the holder, after brushing the part of the post-pharynx in view, should be bent to an angle of 100 degrees or so, and slipped behind the posterior pillar on one side, and glided up and down to the full depth of the fold, the other side being treated in the same way. This treatment need not be repeated oftener than once or twice a week at the physician's office.

Other astringents such as sulphate of copper, chloride of zinc, glycero-tannin, etc. might be used instead, but for directly removing the outside coating of the mucous membrane, and stimulating normal action of the capillaries, no application appears to act as efficiently as nitrate of silver.

For home-treatment the patient should spray the throat freely twice a day with an alkaline solution, and follow this each time by one of the hydrocarbon preparations already mentioned, such as:—

3-per-cent. camphor-menthol in albolene.

5-per-cent. eucalyptol in albolene.

3-per-cent. menthol in albolene, etc.

The general system should also be regulated, the alimentary canal attended to, and appropriate tonics prescribed if necessary.

CHAPTER XLIV.

FOLLICULAR PHARYNGITIS.

THIS disease, as its name implies, is confined to the follicles of the pharynx, particularly to those of the post-pharyngeal wall. The inflammatory process, without extending to the whole mucous surface, produces hyperplasia in a number of isolated spots, scattered over the membrane, the abundance and location of the affected follicles varying in different cases.

Pathology.—The lymph-follicles involved in this disease are enlarged and stand out prominently above the surrounding mucosa. While the muciparous glands are few upon the pharyngeal wall and the lymph-follicles widely scattered, yet it appears to be those situated in the immediate vicinity of the glands that have the greatest tendency to hypertrophy. The morbid process consists of abnormal deposits of lymph-elements accompanied by epithelial growth. In the exudative form, instead of the latter development, the follicular tubules are distended by a cheesy secretion, which exudes, and may crust upon the surface. In some cases the inflammation becomes more diffuse. A number of follicles will be united by connecting submucous hyperplasia, and *plaques* are found varying in size rising above the mucous membrane. When the disease occurs in early life, the granulations are soft and sometimes large; but as they rarely disappear of themselves, they undergo a change as the patient gets older, becoming smaller and more dense in texture. Sometimes the hypertrophy of the follicle is associated with atrophy of the surrounding mucosa. In others there are not only the isolated granulations of the central wall, but also strings of thickly-studded lateral granulations extending upward into the naso-pharynx, behind the posterior pillars of the fauces.

Etiology.—Except in the two extremes of life, during which periods the disease is almost unknown, age has little influence in producing it. It occurs from childhood all the way up to middle age. In early life when adenoids are present we would naturally expect these granulations to occur in conjunction with them, the adenoids being the cause, not by direct extension, but by producing throat

irritation consequent to oral breathing. The formation of adenoids and follicular disease are both influenced in many cases by the presence of scrofulous diathesis. In adult life it frequently occurs as a result or complication of previously-existing nasal disease.

It is said to occur more frequently among women than men, probably owing to the more sedentary occupations of the former, and the consequent greater tendency to the development of disease of the mucous membrane. We should remember, also, how much the pharyngeal mucosa is influenced by the gynæcological condition of the sex.

Granting a tendency toward the disease, breathing a dusty atmosphere, excessive use of the voice, continued nasal obstruction, the occurrence of acute or chronic pharyngitis, or any other conditions which may induce continuous throat irritation may result in the development of pharyngeal granulations.

Symptomatology.—When occurring in children, the symptoms are rarely noticeable, being thrown entirely into the shade by the existing primary disease. In adult life this is different. The subjective sensations are more intelligently realized. The nasal stenosis or post-pharyngeal discomfort may have been relieved, but the dryness and pricking sensations, and hacking cough produced by the presence of the granulations are still there, producing annoyance and discomfort to the patient. The voice loses its full and rounded tone and is easily fatigued.

When the disease is associated with post-nasal catarrh, the posterior wall of the pharynx may be covered with a grayish, stringy coating of mucus-pus, often hiding the granulations from view until it is removed. Then the surface will be seen more or less covered with prominent little hypertrophies. They vary from one to five millimetres in diameter, and, when *plaques* are present, they sometimes cover from one-half to one square centimetre in area.

Although strings of granulations may sometimes be observed running upward behind the pillars into the naso-pharynx, it is comparatively rare to find the posterior pillars affected. When they do form on the pillars or the margin of the velum or uvula, the granulations are very small and hard, like little, red seeds, standing out upon the mucous membrane.

Stiffness of the throat, painful deglutition, and soreness after prolonged speaking are frequent symptoms, and have given rise to the term "clergyman's sore throat" which has often been applied to it. The application seems to be an unfortunate one, as the sore throat

by which so many clergymen are affected is almost always due to other causes. This was particularly exemplified in a paper which I read before the Canadian Medical Association in Montreal in August, 1896, giving the history of 10 cases of so-called clergyman's sore throat. Although it is a slight digression, yet it has a bearing upon the subject, and the quotation of the last few sentences will not be out of place:

"In conclusion, according to old parlance, the 10 cases I have reported might all be called 'clergyman's sore throat,' while in reality only 2 had follicular pharyngitis. All had soreness and hoarseness in a more or less degree; but these symptoms arose from widely different causes, and in several instances hypertrophies of different kinds were found to exist in the one case.

"Briefly to epitomize:—

In 1 there was a large nasal polypus.

In 1 a dislocated columnar cartilage.

In 1 hypertrophy of the faucial tonsils.

In 1 ulceration of the hyoid fossa.

In 2 there were septal ridges.

In 2 septal spurs.

In 2 catarrhal hypertrophies of the post-septum.

In 2 elongation of the uvula.

In 2 pharyngeal granulations.

In 3 turbinal hypertrophies.

"While in only one," and that the most serious case of all, was there uncomplicated laryngeal disease."

Whether a name which will cover such a variety of diseases, merely because one or two symptoms may be present in all, is worthy of a place in medical literature is at least doubtful.

Diagnosis.—Careful examination by means of the head-mirror and reflected light should at once exclude every other disease. The little, round, red or grayish-red spots, shining brightly upon a paler background, could not be mistaken for anything else. When the surface is coated from post-pharyngeal catarrh the spots may be hid, but clearing this away by the use of an alkaline spray will soon render them visible, together with any *plagues* or lateral granulations that may be present.

Prognosis.—This is usually a chronic disease, and rarely subject

¹ Eighteen months later this gentleman died of malignant disease of the larynx.

to spontaneous cure, except as incidental to the lymphatic atrophy, common in old age. Besides the annoyance it causes, in persons who do not require to use the voice unusually, its presence may be of little moment. In voice-users, however, whether public speakers or singers, the presence of follicular pharyngitis becomes a serious matter, as it interferes with the tone and quality, as well as the endurance, of the voice itself. Fortunately, however, it is amenable to treatment in a large majority of cases.

Treatment.—This consists, after cleansing the pharynx of all secretions by the free use of sprays, in destruction of the hypertrophic follicles one by one. For this purpose many methods have been advised, the object being to destroy the overgrowth without injuring the surrounding healthy tissue. London paste and chromic acid are both used for this purpose. The chief objection to each is the possibility of the extension of the effects of the agent to the adjoining mucous membrane. The galvanocautery-point carefully used is entirely free from this objectionable tendency.

Although the operations are slight, and the pain of burning reduced to a minimum, it is always better to precede the operation by the application of a solution of cocaine to the pharynx. Some operators consider this unnecessary. Still, the fact that the deadening of the pharyngeal wall prevents the reflex contraction of the posterior pillars during the operation makes it almost imperative to use it. At the first sitting three or four or half a dozen granules may be touched. The operations should be repeated at intervals of three or four days until all have been removed. A mild spray of $\frac{1}{2}$ -per-cent. solution of thymol in albolene used several times a day by the patient will have a soothing influence during the course of treatment. If catarrhal secretions interfere, they can be removed by an alkaline spray instead. The kind of electric point used should depend on the size and shape of the granulations, and the heat should not be so great as to produce hæmorrhage. The small pointed hypertrophies would require the needle-pointed electrode, the larger ones a thicker tip, and the *plaques* may be incised at a dull heat from side to side with parallel cuts—the whole surface not being destroyed at one time. There is always more or less inflammatory action afterward, and it is always better so to operate as to keep reaction at a minimum point.

If the granulations are very numerous the treatment should be prolonged and sometimes intervals of weeks might be allowed to pass between the cauterizations.

Of course, if the disease owes its origin to neoplasms or overgrowths in the upper respiratory passages, these should be removed before the patient is dismissed from treatment. Any derangement of the system should also be rectified by judicious medication, together with attention to diet and hygiene.

CHAPTER XLV.

ACUTE TONSILLITIS, OR QUINSY.

THE close observation with which this disease has been observed during recent years has established the fact that although the tonsil partakes in the acute inflammation which is developed, in a large proportion of cases the disease originates, not in the tonsil itself, but in the areolar tissue surrounding it. Still there can be little doubt that many cases occur in which the inflammatory action, if not virtually confined to the tonsil, at least has its origin there.

Bosworth believes that all cases of quinsy are peritonsillar inflammations of areolar tissue; Casselberry equally favors this view. The older writers, and Bishop among the new ones, claim the condition as one of amygdalitis, or abscess of the tonsil itself, and any peritonsillar extension to be of a secondary character. In Lennox Browne's experience 55 per cent. of cases occur in the lacunæ of the tonsil, 28 per cent. in the parenchyma, and only 13 per cent. in the peritonsillar tissue.

From my own experience, I believe the origin may be either extratonsillar or intratonsillar. The deep phlegmonous abscess, involving all the peritonsillar tissues, with the whole lateral wall standing out, and pressing the tonsil itself directly across the faucial cavity, may in every instance be peritonsillar in its origin; but others, which are oft-recurring, definitely localized, and acutely painful, in which the most marked ocular signs are in the tonsils themselves, are likely to be tonsillar in their origin, any extension into the surrounding tissues being of a secondary character.

If not, it might be asked, how is it that in the latter class of cases the tonsils themselves steadily increase in size, becoming larger and larger with each successive attack, while, so far as can be seen, the surrounding tissues remain unchanged? And how is it, also, that the removal of a large segment of the hypertrophied tonsil will, in most cases, effectually check the recurrence of quinsy?

Pathology.—Although acute tonsillitis, as a rule, results in supuration, yet in some instances it extends no farther than acute inflammation, becoming red and shiny: according to Leland, the paren-

elymatous variety. There may be infiltration with increased cell and lymphoid development, together with the presence of pathological germs within the crypts of the tonsil. *Streptococcus pyogenes* and pneumococci may be present; but so long as they are all on the surface or within the crypts only, and not within the deeper tonsillar or areolar tissues, phlegmonous abscess does not occur. In a large proportion of cases, however, the infectious process does not stop here. The lacunæ of the tonsils may become blocked. Pathogenic germs may already have found an entrance, and, the crypts being closed, exposure to the surface cold may produce hyperæmia of a rheumatic throat, and inflammatory action be developed in all its intensity. In a rheumatic diathesis the peritonsillar tissue, particularly when pressed by a hard, hypertrophied tonsil, will be prone to inflammatory action, and having commenced may soon spread to the surrounding tissue and the tonsil itself. Pus-corpuscles are formed, a phlegmonous abscess results, and streptococci pyogenes may be found in large numbers. Sometimes pneumococci and staphylococci will also be present.

The site of the abscess varies greatly, sometimes it is in front of the juncture of the anterior and posterior pillars. At others deeply seated behind the lower part of the anterior fold, pressing the tonsil inward almost to the opposite wall of the pharynx. Again, it may be at the posterior side of the tonsil, deeply engaging the soft palate and uvula in inflammatory infiltration, while not infrequently the whole body of the tonsil itself may be the subject of phlegmonous enlargement.

When the pus forms, the soft character of the surrounding tissues do not tend to limitation. Fortunately it spreads equally in all directions, and, there being no dense membrane between it and the surface, spontaneous evacuation usually soon occurs. When the supuration is deeply seated, behind a dense hyperplastic tonsil, progress toward the mucous surface is more tardy and the pus may burrow extensively into the surrounding tissues. Velpeau reports a case in which the pus made its way into the cellular tissues of the neck as low down as the clavicle. Reid reports another in which the pus burrowed along the course of the great vessels into the pleural cavity, resulting in death from empyema.

In some cases the tonsillitis is confined entirely to the tonsil, and is deeply ulcerative in character. Lake reports a case of this nature. The ulcer was as large as a shilling and covered with a tenacious gray slough. He removed the tonsil and in five days the young man

was well. The microscope revealed large masses of beaded bacilli on the advanced edge of the slough.

Pakes reports three cases of acute tonsillitis in which the tonsils themselves were the seat of the disease, being in each case red and swollen. On microscopical examination of the blood-serum a pure culture of Friedlander's bacillus was found in each, in one of them being associated with staphylococcus aureus.

Etiology.—The period of life during which this disease is most prevalent is between the ages of 15 and 40 years, the larger number being near the centre of that period. Still, some occur even in childhood, while a very few are reported among the fifties and sixties. The rheumatic diathesis is a predisposing cause, and in many cases acute rheumatism of the joints is a prelude to rheumatic tonsillitis, while in other instances the quinsy precedes the general rheumatism. Successive attacks of tonsillitis tend to produce hypertrophy of the tonsil, while the increasing hypertrophy promotes susceptibility to inflammatory action. The disease occurs more frequently among males than females, owing to the greater exposure as well as climatic privations to which men are subject. There is also in some cases a marked hereditary tendency. This occurs chiefly in strumous cases, hypertrophied tonsils being a prominent feature of development. One fact is readily observed, that quinsy rarely occurs when the tonsils are of normal size.

The usual exciting cause is sudden and unequal exposure of the body to cold. The chilling of the surface, and the consequent congestion of any weak internal organ, will in many instances tend to the development of the disease. There is another point, which I do not remember to have seen referred to, but which I have observed in practice, and that is that the majority of cases of quinsy occur in mouth-breathers. The constant oral respiration exposes the throat to a variety of changes, both of temperature and purity of air, which the normal breather escapes.

Symptomatology.—The depressing effect which this disease has upon the nervous system is indicated by the feeling of weariness accompanied by chilliness and exhaustion, with which it is often ushered in. For the first day or two general febrile action takes place, rising to 102° or 103°, in some cases even higher.

These symptoms are accompanied by pain in the affected tonsil. swelling soon takes place, and in two or three days it may become so great as to materially interfere with deglutition. When the disease

is peritonsillar the tissues become very brawny and painful, the muscles swollen, and the movements of the inferior maxilla are materially interfered with. The efforts to swallow even fluids are sometimes almost unavailing, and, owing to the imperfect action of the swollen palate, they may escape through the nose in the effort of swallowing. The voice becomes muffled and indistinct, and sleep almost impossible. At first the pain is sharp and lancinating. Later on swelling occurs, and the pain becomes of an oppressive, aching character. As the swelling in the throat becomes greater, saliva dribbles from the mouth and the jaws become almost immovable. The temperature goes down, the body may be bathed in cold sweats, and even respiration may be stertorous and impeded. Little or no nourishment can be taken, and the recumbent posture becomes almost impossible. This condition may continue several days without relief is given by surgical means. Finally the pus, aiming at some point within the pharynx or back part of the mouth, gradually softens the surface-membrane; the mucosa gives way, and, the pus being discharged freely, the patient obtains immediate relief.

When the disease attacks both tonsils, it is rarely exactly at the same time, but in quick succession, the one being invaded within two or three days of the other. They then run their course almost together, the main difference between single and double tonsillitis being in severity of symptoms.

Diagnosis.—The acuteness of the inflammation, with its rapid development, and high fever, should distinguish it in all cases from syphilis, tuberculosis, or malignant disease. With reference to other acute affections, the characteristic symptoms of quinsy should render the diagnosis plain. The sudden onset of high fever, accompanied by sharp unilateral pain in the tonsil, bright redness and swelling in one side of the throat, the difficulty in swallowing, the immobility of the jaws, the difficulty of bending the neck, and the peculiar distressing look of the face point to this disease in contradistinction to all others. When the disease is double, the intensity of the symptoms should render the diagnosis more certain. From phlegmonous abscess of the post-pharynx it must be distinguished by the position of the enlargement, and the greater impediment to respiration which the disease induces. Palpation is always a material aid in diagnosis. In the early stages the brawny feeling of the abscess, wherever located, may be outlined, and, as the suppuration advances, the point of softening can be readily discovered.

In the commencement there is a possibility of confounding this disease with diphtheria and acute lacunar tonsillitis, but attentive observation should remove all difficulty. The onset is more sthenic than in diphtheria, but there is less enlargement of the glands, no albuminuria, no development of false membrane. As to lacunar tonsillitis, the presence of tonsillar exudation, unaccompanied by much enlargement or by deep-seated pains, should distinguish it at once from the more serious malady of tonsillar abscess.

Prognosis.—Acute, painful, and exceedingly distressing, as the disease always is, it very rarely proves fatal *per se*. When it does do so, it occurs either from œdema of the air-passages or extension of the abscess into the surrounding tissues. It is a self-limited disease, and runs its course in from one to two weeks. After free evacuation of the pus-cavity, whether by necrosis of the surface-tissue or by surgical operation, recovery is usually very rapid.

The possibility and even probability of the recurrence of the disease should always be borne in mind.

Treatment.—Unfortunately in this, as in many other affections, the patient, as a rule, does not seek treatment until the disease is well established; and by that time it is too late to abort it. Prompt treatment on the first appearance of the throat symptoms would in many instances check its progress. For this object a saline cathartic, such as sulphate of magnesia or Rochelle salts, may be given, followed at once by a dose of $\frac{1}{2}$ to 1 gramme of quinine. Prompt treatment of the throat, also, should be attended to. First wash it thoroughly with a spray of Dobell's solution. Then apply a 10-per-cent. solution of cocaine freely to the affected tonsil, and follow this by brushing it with a 10-per-cent. solution of nitrate of silver. The cocaine temporarily drives away the blood from the congested tissues, while the cathartic is attempting to prove its efficiency. The astringent and antiseptic effect of the silver will remove a good deal of the superficial irritation, as well as destroy the surface and lacunar bacteria, thus producing a general sedative effect upon the inflamed gland.

Other astringents—such as solutions of sulphate of copper, alum, or tannic acid—might be tried, but they lack the effectiveness of the silver nitrate.

If the tonsillitis is of rheumatic origin, full doses of salicylates should be given.

Failing the abortive treatment, other measures will be required. As the disease advances, it becomes very difficult to open the mouth;

and, while examinations may be necessary, in order to keep cognizant of the location and progress of the disease, frequent digital examinations are inadvisable. The touch of the finger in the early brawny condition may help to clear up the diagnosis; but even then it is scarcely necessary. Subsequent to that, the touch of the cotton-holder with its thin, firm stem and little pledget of cotton-wool on the end, aided by reflected light, should be sufficient to indicate the condition of the parts.

When pointing is indicated, from the grayish color and softened condition of any spot, it is best to open the abscess freely at once and liberate the contained pus. The question often arises: Should we lance the inflamed tissues earlier, or before we are absolutely sure of the presence of purulent matter? In many instances I believe we should. I have seen instances where a deep incision into the tonsil itself, producing free venous hemorrhage, without the outlet of pus at all, has been followed at once by relief of the most urgent symptoms and gradually recession of the disease. Another instance I can well remember, in the case of a rheumatic patient, in which the pharynx was almost filled with an intensely-painful right-sided phlegmon. The teeth could not be opened more than half an inch; but, inserting a tongue-depressor, a deep and long incision was made parallel with the edge of the anterior pillar. Bleeding was very free, but there was no pus. Relief from the severe tension was marked, and twelve hours later pus commenced to flow from the wound.

While incisions to give relief require to be free, the proximity of important vessels should always be borne in mind. The internal carotid artery is in near proximity to the posterior and external border of the tonsil, and if wounded death might result before the vessel could be cut down upon and tied. As a rule, however, it is better not to lance until we are morally certain of the formation of pus; and, without the operator is perfectly sure of his bearings, this should be the law in all cases. Sometimes the pus-cavity is not a single sac, and several openings may require to be made before all the pus can be discharged.

Frequent gargling of the throat with hot water, before and after operation, will usually have a grateful effect upon the patient; and the same may be said of steaming the pharynx by means of a rubber tube attached to a kettle of hot water.

With regard to external applications, many believe in hot poultices to the neck, while others recommend the application of crushed

ice in the same way. In my own experience a simple method has sufficed, giving equal comfort with less trouble. Warm spirit of turpentine and olive-oil in equal parts were rubbed freely over the region of the tonsils and then a thick narrow layer of surgeon's absorbent cotton was applied from side to side and fastened in position by a neck-bandage. This was repeated twice a day, securing a sensation of warmth and support.

During the progress of the disease, light and nourishing diet will be required, the amount to be controlled by the power of deglutition of the patient.

After recovery I do not know any systemic treatment that will remove the tendency to recurrence. The ordinary rules regulating diet, clothing, and hygiene should, of course, be followed. The one thing, however, of all others, where there is either hypertrophy or hyperplasia of the tonsils which will prevent the return of the quinsy, is the removal of the diseased glands.

CHAPTER XLVI.

DISEASES OF THE UVULA : OEDEMA; ELONGATION.

OEDEMA.

THIS is a simple serous exudation into the deeper layers of the mucous membrane. When severe and prolonged, the fibres of the azygos uvulae may be involved, also the soft palate and pillars of the fauces. It is the second stage of inflammatory action in the softened and relaxed tissues.

Etiology.—(Edema of the uvula is almost always of a secondary nature, having its origin in acute or chronic inflammation of some portion of the nose or naso-pharynx. Occasionally it is a reflex traumatism from surgical operation upon the turbinateds or faucial tonsils. Sometimes it is idiopathic.

In one patient I was struck with the peculiar fact that on several occasions the application of 10-per-cent. solution of cocaine to the nasal cavity preparatory to operation was followed, in less than half an hour, by oedema of the uvula, which in a couple of hours spontaneously subsided.

It may, in a few cases, be the result of pharyngeal tuberculosis and also of general anasarca.

Symptomatology.—A tickling sensation in the middle of the throat, with a feeling of fullness as if from the presence of a foreign body, accompanied by constant efforts to clear the pharynx by hawking and swallowing, are the leading symptoms. Physical examination will at once reveal the condition. The palate will be relaxed and the uvula—elongated, thickened, and baggy—will have lost its normal pink hue, and assumed that of a transparent bag of serum.

Prognosis.—When it arises from traumatism, the subsidence will be spontaneous, usually within a few hours. When from acute or chronic disease, the swelling may not so soon abate. Each case, even without treatment, should, in time, subside, unless it owes its origin to general dropsical effusion. No fatal case has been recorded.

Treatment.—As a rule, the treatment for the removal of the primary cause is all that will be required. When the symptoms are

very distressing, astringent gargles of tannic acid, subacetate of lead, alum, etc., might be used. In others the surface of the uvula might be brushed with a solution of cocaine, and then the mucous membrane could be punctured in a number of places with the point of a lance, to allow the effusion to escape. Subsequently the throat could be steamed, or astringent gargles used.

ELONGATION OF THE UVULA

This is frequently associated with hypertrophy of the organ. Normally the uvula should hang down freely within the fauces, without touching the tongue, and of a length varying from eight to twelve millimetres. The mucous membrane should fit closely to the muscle beneath, and the surface should be firm and of a clear, pink color.

When elongation takes place, the length may be even three centimetres or more, and unless the increase in length arises purely from oedematous thickening of the mucous membrane there is usually present hypertrophy likewise.

Pathology.—As a rule, the condition of chronic irritation which eventuates in elongation confines itself to producing hyperplasia of the mucous membrane, the white fibrous and elastic tissue of the muscle remaining unaffected. Consequently the elongation is purely below the azygos. Still, cases occur in which the whole organ is of abnormal thickness as well as length; of a red, deeply-congested color; and in which even the free application of 10-per-cent. solution of cocaine will produce very limited shrinkage. In these cases the azygos muscle extends down decidedly below the centimetre-line, and the whole organ has the appearance of a large fleshy mass. The permanent congestion seems to result in granular hyperplasia of the fibrous-tissue elements, situated below the true mucosa.

Etiology.—Elongation of the uvula is so frequent an attendant upon chronic nasal and naso-pharyngeal disease that it would seem, in the majority of cases, to owe its origin to their presence. The perpetual movements of the palate to clear the naso-pharynx keep it in a state of constant irritation, resulting successively in relaxation, elongation, and hypertrophy. A weakened condition of the system or loss of muscular tone may accentuate the trouble, allowing a relaxed palate to drop the uvula upon the tongue. The constant effort of the patient to dislodge or swallow the seeming foreign body has the effect of keeping the uvula in a congested and irritable condition.

In some instances the elongation is congenital. In these cases,

where there is no naso-pharyngeal irritation to aggravate the trouble, there is little likelihood of hypertrophic development, the simple elongated, oedematous uvula being all that is likely to occur.

Symptomatology. The symptoms come on so gradually and painlessly that elongation frequently is not recognized until investigation for some other disease reveals its presence. The symptoms are those of ordinary throat irritation similar to those of oedema of the uvula, but of minor degree.

Deglutition is not much interfered with, but phonation, when there is hypertrophy as well as elongation, is frequently affected. This is particularly the case with public speakers and singers. In these it gives the voice a muffled, throaty character, as if the intonation issued from the pharynx without the clear control of the muscles of the tongue and mouth.

The cough produced by elongation of the uvula is of an irritable, nervous character and unaccompanied by expectoration, save that which can be hawked up from an ordinarily catarrhal pharynx. When the uvula is very long, the supine position will cause it to lie on the post-pharyngeal wall. While the upright position, if the larynx is situated high in the throat, will make it touch the epiglottis, in either case producing temporary irritation and cough. Asthma is recorded as one of its reflex results.

Diagnosis. This can only be a matter of simple examination. Whether thick or thin, if long and pendulous, and accompanied by throat catarrh and nervous cough, it may be concluded that the condition of this organ is abnormal.

Prognosis.—To life it involves no danger. To general health very little. To the speaker or singer the presence of the elongation is not a good omen, as, without operation, the difficulty is likely to be permanent. Hence in these cases, and in all where it is accompanied by throat irritation, the prognosis should point to ablation of a portion of the offending member.

Treatment.—In mild cases devoid of annoying symptoms the use of astringent gargles may be of benefit. Perhaps the best of these would be glycco-tannic or sulphate of iron. Touching the end of the uvula also with a 10-per-cent. solution of nitrate of silver might be of service. When the elongation is produced entirely by hypertrophy of the mucosa, brushing with tincture of iodine may be attended by good results.

In most cases, however, a slight operation will be found neces-

nary, the redundant portion of the uvula requiring to be removed. In doing this there is always danger of cutting off too large a portion. If we desire to establish a simple rule that might govern all cases in which operations was absolutely required, it might be this: *Never to cut off more than one-half from the length of the uvula.*

As indicated, from what has already been said, the excision should only be that of the hypertrophied mucous membrane at the end of the uvula, in cases unattended by muscular hypertrophy.

There are several methods by which the little operation can be performed, each method requiring different instruments. Mackenzie's uvulotome might be mentioned, constructed on the principle of the faucial tonsillotome. Bosworth's serrated scissors is also praised as a good instrument, inasmuch as the serrated blades prevent any possibility of slipping (Fig. 79). De Blois's galvanocautery-guttoutine is an ingenious instrument, preventing any hæmorrhage at the



Fig. 79 —Uvula scissors. (After Bosworth.)

time of operation. Kyle uses a sharp bistoury, cutting out a wedge-shaped piece from the end of the uvula and thus avoiding a club-shaped stump.

My own preference lies with the long and curved scissors together with long, mouse-toothed forceps.

In operating I invariably secure the patient's assistance. (I have only seen one case in childhood, and in this the uvula was removed under chloroform.) A 10-per-cent. solution of cocaine is first applied on a pledget of cotton to the uvula. The patient then holds the tongue down with a tongue-depressor. With the left hand the operator seizes the uvula near the extremity with the forceps, and draws it gently forward without putting it on the stretch; and with the right applies the scissors, leaning upward and backward, so as to cut the uvula with an acute angle to the front. By this means the healing is mostly on the posterior surface, the anterior mucous membrane being left almost entire (Fig. 80).

No further treatment is required except to insist upon light, soft diet of a cool temperature for a day or two. No condiments or hot fluids or irritants of any kind should be taken during that period, on account of the acute pain they might produce.

Severe hæmorrhage after uvulotomy is exceedingly rare. One or two deaths have been reported following the operation, but it is doubtful if the death really occurred as a result. A few cases of severe hæmorrhage after the operation, some of them difficult to control, have also been recorded. In a number of these many hours elapsed before the bleeding could be stopped; and in half of them

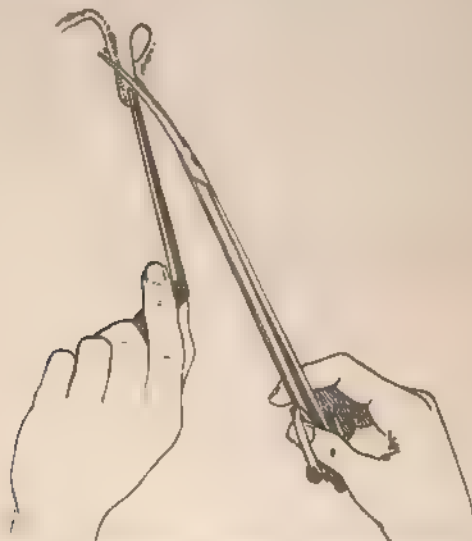


Fig 80 — Excision of uvula (After Bosworth)

the whole organ had been removed. If the uvula itself was hypertrophied as well as elongated, and the large fleshy mass was excised entirely on a line with the arches of the soft palate, one would not wonder at hæmorrhage being severe. If, on the other hand, it was accepted as a fixed principle never to remove more than one-half the length of the organ, the hæmorrhage should always be easily controllable. I never saw a case which bled severely, and invariably what little bleeding did occur was over in a few minutes.

If cocaine has been freely applied before operating, there will rarely be any bleeding at all for several seconds after the piece is

snipped off, owing to the blood being driven out by the astringent action of the cocaine; then slight bleeding only will occur.

I have not seen a case recorded of return of abnormal growth of the uvula after it had been once excised. Some years ago, however, a clergyman, aged 59, came to me for treatment. I found that he had nasal polypus, relaxed palate, and a very long uvula, the central muscular portion extending almost to the end of the organ. He informed me that a throat specialist had performed uvulotomy several years before, but that it had grown again and he desired to have it removed. This time I reduced it to the length of about one centimetre. It has given no further trouble.

Occasionally we meet with cases of congenital bifurcation of the uvula. One branch is usually smaller than the other and planted to one side. If no symptoms arise as a consequence, they should not be interfered with. Sometimes for æsthetic purposes the smaller may be removed. When the bifurcation is even, extending into the palate, the edges should be pared and the cleft closed by fine sutures.

CHAPTER XLVII.

RETROPHARYNGEAL ABSCESS.

THIS disease resembles tonsillar abscess, except that instead of occurring in the tonsillar region it has its origin in the post-pharyngeal wall. Quite possibly aggravated cases of peritonsillar abscess might extend by submucous infiltration into the deeper pharyngeal tissues and result in extensive pus-sac formation.

Pathology.—The pathological condition of retropharyngeal abscess occurring in childhood differs from that occurring in mature years. In early life the lymphatic tissues are in a state of active development, and in their immature condition are more prone to disease, whereas, when maturity is reached, this development has been completed; permanent shrinkage has already commenced, and there is little tendency to suppurative action in them. In adult life it is the cellular tissues rather than the lymphatic that are liable to inflammatory action; but there is probably no greater tendency to abscess-development at this period in the throat than in other regions of the body.

The development of abscess in cellular tissue is usually rapid; and, just as quinsy will run its course in a very few days, so will retropharyngeal abscess in the adult result in pus-formation and extension into the surrounding tissues in a similar length of time.

In childhood, however, the suppuration takes place in strumous lymphatic glands which have previously been swollen, and the development of the disease is a slow and tedious process.

Etiology.—As in the pathology, so in the etiology, the disease differs according to the period of life in which it occurs. In childhood the presence of the lymphatic diathesis renders the tissues of the post-pharynx more ready to take on suppurative action. The consequence is that during this period the primary cause in a majority of cases is the same: the presence of a strumous habit. In these cases any cause which may excite glandular inflammation on either side of the post-pharyngeal wall may result in suppuration.

In older persons the causes are more idiopathic in their character.

each individual case being dependent upon some special cause of its own. Some cases arise from caries of the vertebræ, although the percentage is very small; some as sequelæ of exanthemata, particularly scarlatina, equally small in number; and occasionally one from traumatism. Perhaps cold, acting upon a sensitive throat, the physical health being at the time below par, may in adult life be the most frequent cause. Sex has no special influence. In old age it rarely, if ever, occurs.

Symptomatology.—In children the symptoms are those attending the slow suppuration of the lymphatic glands. There is rarely any chill, but the feeling of malaise, loss of appetite, and languor. The fever is very slight and accompanied by gradual loss of flesh. Days may elapse before attention is drawn to the throat. Deglutition gradually becomes difficult, and may finally become impossible, while the voice assumes a peculiar quacking tone.

On examination of the throat the post-pharynx will be found to be swollen as if by oedema, particularly on one side, filling up the pharynx and pressing upon the tongue. Dyspnœa also becomes, in many cases, a serious symptom, owing to the pressure of the phlegmonous sac upon the larynx, producing defective aeration of blood and more or less cyanosis. The child's head may become fixed: bent forward slightly if the disease is bilateral and toward the unaffected side if unilateral.

In adults there are no long-continued premonitory symptoms. There is no glandular affection; but coming on suddenly are the direct symptoms of severe faucial lesion. This is in the form of acute inflammation in a localized spot, resulting in early suppuration, with rapid extension into the surrounding tissues.

There is pain in the pharynx from the first, aggravated by any attempt at deglutition. The disease is sthenic, usually ushered in by a chill, and marked by a rise of several degrees in temperature; whereas in children the fever is of a low asthenic type.

Another notable difference is that in adult life, while deglutition may be exceedingly painful and almost impossible, dyspnœa rarely occurs.

Diagnosis.—On examination the post-pharynx will be dark and swollen, and in due time the point of nearest approach of pus to the surface will be noted by its grayish, dead appearance. These, with the general phlegmonous condition, either across the whole of the posterior wall or limited partially to one side, should indicate pretty

well the nature of the disease. Palpation would indicate the presence of pus or the brawny condition preceding it. The same might be said of the careful use of the cotton-holder, the elastic sensation at the point of softening being recognizable by either means.

In the asthenic abscess of childhood there is less localized inflammatory action, and perhaps more of an oedematous appearance. The disease is also more likely to be unilateral. Hence, from the one-sided fullness, together with the indications from touch, the diagnosis should not be difficult. Its chronicity in child-life should not be forgotten. In all cases, both in children and adults, the peculiar character of voice, fixation of the head, absence of cough, and freedom from tonsillar complication should help to exclude all other diseases.

The possibility of mistaking aneurism for post-pharyngeal abscess seems almost incredible. The strong regular pulsation of the one, free from all inflammatory action, should, by sight as well as touch, distinguish it positively from abscess of the pharynx.

Prognosis.—The phlegmonous abscess of adult life runs its course in something like a week. Then, in favorable cases it will open spontaneously, and in a few days heal. When lanced earlier, the course is shorter. It is rarely a dangerous disease, even if let to find its own outlet, although both painful and distressing.

In childhood its course is much more prolonged, extending over a number of weeks, and not unattended by danger. Unsuccessful diagnosis may prolong the disease and endanger life from suffocation, rupture of abscess into the air-passages, or prolonged anæmia and debility. Oedema, also, might lead to stenosis and death.

When the disease arises from spinal caries the prognosis is not good, inasmuch as the cause cannot be removed.

In very severe cases, when unrelieved by surgical interference, there is serious danger of general septicæmia, to be followed by a fatal issue.

Treatment.—In adults the treatment is almost identical with that of quinsy. The abscess should be opened as soon as the presence of pus becomes certain, and the swollen and inflamed tissues may be scarified even before the existence of pus is discovered.

In young children, considering that the phlegmonous inflammatory condition is absent, scarification would be contra-indicated, but opening of the abscess as soon as discovered should certainly be done. As a rule, the opening should be made in the most dependent part of the abscess, and into the pharynx. Cases, however, do occur

in which an external incision is the best; but this can only be when the suppurative lymphatic glands can best be reached in that way.

Poulticing in this disease can be of little avail. In juveniles the condition is too asthenic to require their application. In adults they cannot reach the affected parts, and hence are useless. If applications to the neck are required at all, the warm cotton-wool rolls already referred to in treating of quinsy are all that would be required. In children after evacuation the application of tincture of iodine to the swollen glands might be productive of good.

Supporting measures and nourishing diet in children are always in place, and regulation of the *primæ viæ* in adults, with antiperiodic treatment, might be of service.

ACUTE INFECTIOUS PHILEGMON OF THE PHARYNX is an exceedingly rare and fatal disease. It is specific in character and differs from retropharyngeal abscess in being more virulent, but not unattended by development of pus-sacs. Treatment is said to be supporting, but unavailing.

CHAPTER XLVIII.

HYPERTROPHY OF THE FAUCIAL TONSILS.

IN early life this disease is essentially an enlargement or proliferation of the lymphatic tissues of which the normal tonsil is composed. All the elements of the tonsil are engaged in the process, but it is the lymphatic cell-development which is chiefly stimulated.

In adult life any hypertrophy occurring in the tonsil usually means hypertrophy of the connective-tissue elements, and not so much of the adenoid, producing permanent thickening of the fibrous and parenchymatous tissue of the tonsil. Hence arises the hard, smooth hyperplasia so often seen in men and women in contradistinction to the soft, lymphoid hypertrophy of childhood. There is also the lacunar variety, not infrequently met with, in which the lacunae become greatly distended with caseous matter, making clefts and sinuous passages in the tonsil, ultimately involving the parenchyma.

There is likewise what Pyncheon has recently described as the "Submerged Tonsil," being a condition in which, notwithstanding a general fullness of the throat, no distinct tonsillar enlargement can at first be seen. Closer inspection, however, will reveal the true condition. In some cases the faucial pillars are greatly enlarged, causing an even lateral fullness with the tonsillar thickening. In others the enlarged tonsil is hidden by the plica triangularis, already described, which sometimes extends downward and backward from the margin of the anterior pillar.

Pathology.—In early life there is in the tonsils an active proliferation of lymphoid elements. The crypts are widened and can be seen studding the surface. The enlarged tonsil fills in the cavity between the anterior and posterior pillars on each side, standing out prominently and projecting toward the mesial line. The mucous membrane is unchanged, dipping down within the folds of the crypts much as in health. The papillæ are enlarged and flattened by the distension of the organ. The lymphatic bodies are notably enlarged and the blood-vessels increased in size and number, while the connective-tissue fibres, even in childhood, may be increased, interlacing and binding together the lymph-bodies as a whole (Fig. 81).

In adult life the natural tendency toward shrinkage of the lymph-tissues is usually apparent, even in cases of extensive hypertrophy. These bodies may have been enlarged, but they are bound down by the connective-tissue growth. Proliferation continues; the crypts themselves are invaded until they are obstructed; and, instead of the open follicles which are found in the normal or even in the hypertrophied tonsil, the smooth, rounded, hyperplastic surface is left in its place. This hyperplastic tonsil thus consists of bundles of con-

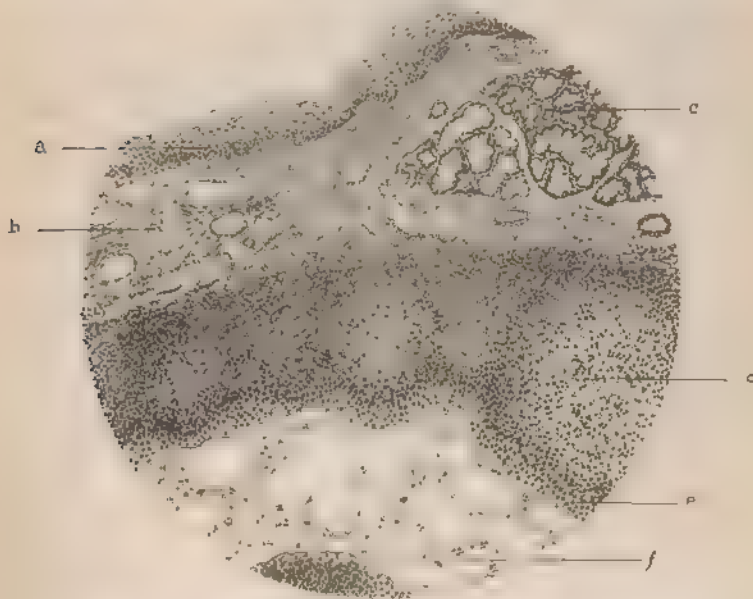


Fig. 81.—Simple hypertrophy of faucial tonsil (57 diameters). *a*, Stratified squamous epithelium. *b*, Connective tissue layer containing blood vessels. *c*, Mucus secreting glands. *d*, Lymphoid tissue containing four nodules. *e*, Epithelium of crypt. *f*, Cavity of crypt. (Author's specimen by Bensley.)

nective-tissue elements, containing blood-vessels, nerves, and shrunken lymphatic bodies. In this form, from the supply of blood being limited, the surface is sometimes of a paler hue than natural. When the lacunæ have become distended by the secretion of caseous matter, this can be squeezed out readily by pressure.

In other instances, the hypertrophic form of childhood does not materially change as mature years are reached, any connective-tissue

development only increasing the general enlargement of the mass. De Simoni speaks of the development of vegetable parasites, or blastomycetes, as an interesting histological feature associated with chronic tonsillitis in the light of etiology.

As a rule, whatever the form of hypertrophy, it is bilateral, though it is rare that the two sides are equally enlarged. The bilateral condition is considered to be an indication of the diathetic nature of the disease. This, however, does not end here; but, where we have double tonsillar hypertrophy, there is usually enlargement of the pharyngeal tonsil likewise.

Etiology.—This not infrequently is a congenital condition, the enlargement having commenced prior to birth, as a manifestation of a lymphatic or strumous diathesis. As a rule, the hypertrophy commences during childhood, a large percentage of the cases being developed earlier than the tenth year. Bashop places the largest number of cases between the tenth and twentieth years. Probably all cases occurring after the latter age are of either hyperplastic or lacunar form.

The diathetic habit would naturally involve the hereditary influence, and, given this tendency, frequent exposures to cold would keep the throat constantly liable to attacks of inflammatory disease, while each attack would leave additional enlargement.

In the same way the exanthematous diseases—scarlet fever, measles, diphtheria, etc.—all of them frequently leave in their trail the commencement of deep-seated tonsillar hypertrophies. Congenital syphilis, too, is said to be a potent element in the production of this disease, while the rheumatic habit, leading so frequently to pharyngeal rheumatism in adult life, is the direct cause of many cases of severe hyperplasia.

Symptomatology. In childhood the external appearance of the face, without examination of the throat at all, is almost sufficient to indicate the presence of the disease, at least sufficient to divide the cause with adenoid enlargement. The facial symptoms are those spoken of in connection with that disease, although they are probably exaggerated more in pharyngeal than in faucial hypertrophy. When the tonsils alone or in combination with adenoid enlargement are sufficiently hypertrophied to produce nasal stenosis, the facial symptoms become very apparent. The vacant look, the open mouth, the pinched nostrils, the oral breathing, may all be present; while stertorous respiration and restlessness are regular, nocturnal symptoms.

These symptoms are all of a mechanical character. The tonsils act like foreign bodies obstructing the throat and naso-pharynx and preventing normal nasal breathing. This forced and continued suspension of natural respiration tends to produce pharyngeal congestion, resulting in increased hypertrophy with each inflammatory attack.

Embarrassed respiration is another result which often occurs, particularly in early life, and in rachitic or scrofulous subjects is likely to be followed by chest deformity. The voice also becomes affected, not only with the so-called nasal twang, but also from a thick, muffled tone, resulting from unnatural pharyngeal fullness.

Deglutition is not much interfered with, except in young infants, when, as in the case of adenoids, the impossibility of normal nasal breathing prevents the child from nursing with any comfort.

It is doubtful whether enlargement of the faucial tonsils has the effect upon the Eustachian tubes usually assigned to it. There are undoubtedly many cases of deafness and chronic ear disease associated with tonsillar hypertrophy; but it must be conceded that, almost invariably, notable hypertrophy of the faucial tonsils is accompanied by enlargement of the pharyngeal tonsil; and that it is to the latter that the pressure upon the Eustachian tube is due.

Excessive tonsillar secretion is not a characteristic of this disease. Cheesy concretions, however, are deposited in some cases within the lacunæ, producing soreness by their presence and an offensive odor from long retention.

Diagnosis.—Thorough examination with or without reflected light should in all cases be sufficient to establish a correct diagnosis. To insure this the tonsil should be examined in two positions: 1. With the posterior faucial pillars in their natural relaxed position; that is when the mouth is wide open, the anterior and posterior pillars standing parallel with each other. This can usually be accomplished by gently depressing the tongue. If enlarged, the tonsils will stand out prominently beyond the pillars projecting toward the medial line. 2. With the posterior pillars drawn tightly and the tongue well depressed. By this means the tonsils are thrown face forward and all the inequalities and irregularities of outline become distinctly visible. They are not only turned forward, but, in a measure, inside out as well, the deep sulci and wide clefts which so often occur, and which remain unnoticed in the normal position, being brought into view.

It is said that there is sometimes danger of mistaking an enlarged tonsil for a tonsillar abscess. The latter is attended by fever, pain,

and peritonsillar fullness, which are all absent in the former condition. Digital examination should remove any remaining doubt.

In after-life unilateral enlargement between the pillars might arise from malignant disease, but the distinguishing features of cachexia, acute pain, and rapid enlargement, with ichorous discharge which distinguish cancer, would prevent a wrong diagnosis.

I have seen one case where left tonsillar fibroma developed in a lawyer, aged 47, some time after an hyperplastic tonsil had been removed, but for which fact it might have been taken for a simple tonsillar enlargement. It was also distinguished by its white, fibrous character and the shooting pains which passed in different directions from it. It was sessile and prominent and interfered with the use of the voice. It was removed by repeated galvanocautery operations and did not return.

Occasionally a tonsillith, buried within the gland, will cause inconvenience by its size and may be mistaken for simple hypertrophic lesion.

Prognosis.—The natural tendency is for the tonsils, when not seriously enlarged, to shrink away gradually and be absorbed during the earlier years of maturity, so that a mere semblance of the tonsillar tissue remains. And when hearing is unaffected, when respiration is normal, and there is no tendency to soreness of the throat, even if the tonsils are hypertrophic, Nature should be allowed to do her own prescribing, and the tonsils left severely alone.

On the other hand, when they are seriously enlarged, oral breathing being one of the results, there is serious risk to the health of the patient in several ways. Not only does the nasal stenosis deprive the air of respiration of the advantages of saturation, cleansing, and heating, which nasal breathing provides, but the open mouth makes the enlarged tonsils still more susceptible to irritation. The germs of disease floating in the air find a ready *nidus* for development in the open sulci of the tonsils. These large bodies are particularly susceptible to infection, and it is well known that children having tonsillar hypertrophies are more prone to the diseases of childhood than those who do not possess them. Hypertrophied tonsils are also liable to attacks of quinsy; and when children grow up to adult age, with hypertrophy giving way to hyperplasia, the periodic attacks of quinsy often continue for years, constantly increasing the connective-tissue development.

Treatment. Medical treatment for enlarged tonsils, both inter-

nal and local, has so frequently been tried, and with such uniformly unsatisfactory results, that it is almost useless to speak of it here. It is possible that in mild cases the local application of iodine, or, where there is atony of system, the administration of iodide of iron internally may be of some use. So also astringent gargles of tincture of iron in solution, or the local application of nitrate of silver, might be tried in cases in which for various reasons operative treatment would be inapplicable; but, when serious symptoms arise from the presence of the hypertrophied masses, extirpation is the only reasonable treatment.

Of course, before operating, it is always best to secure the consent of the patient, or, in the case of children, the consent of the guardian in charge.

The various methods of operation, by excision with curved scissors, bistoury, galvanocautery-knife, cold-wire snare, galvanocautery-snare, or by the various tonsillotomes, all have their advocates. But the last method, in all cases where the tonsillotome or guillotine can be used, is the one most generally adopted (Fig. 82).

In all cases, before operating the throat should be thoroughly cleansed by the use of an alkaline spray or disinfectant throat-wash. And it is best, when a general anæsthetic is not used, to paint the tonsils freely with a 15-per-cent. solution of cocaine or eucaine. I see no reason for inducing unnecessary pain in any patient, and, as the drug is entirely under the control of the operating surgeon, there need be no risk whatever of forming the narcotic habit, by its judicious application. The cocaine may not make the use of instruments entirely painless, but it will materially lessen the suffering.

As the majority of patients requiring tonsillotomy are children, I have, as a rule, found it the best plan to administer a general anæsthetic to them. While it may be quite possible to adjust the instrument to the first tonsil without exciting the child's alarm, the second adjustment would be impossible without provoking terror as well as resistance. By using an anæsthetic both of these are avoided.

For performing tonsillotomy many varieties of tonsillotome are in the market. I think, on the whole, however, that Mathieu's is to be preferred, particularly with its most recent modification; that is, with smooth spear-points, the barbs near the ends being removed. They are intended to hold the tonsil for extraction, after it has been excised. This would seem to be unnecessary; as in using the newer instrument, the tonsil, in my experience, has always remained upon

the points during extraction, notwithstanding the absence of the barbs; and could be slipped off more readily afterward. One beauty of this instrument is the power of adjusting the exact amount of traction you desire to make upon the tonsil by means of the screw in the spear-blade. The only fault with the instrument is the fact



Fig 82 Mathieu's tonsillotomes.

that it is composed of distinct segments, and requires to be taken to pieces to be disinfected and cleansed, after each operation. Still, this only takes a minute or two, and can be attended to easily by any nurse or assistant.

In applying the tonsillotome, the patient holding the tongue

down at the time with the depressor, it is important to pass the instrument well over the lower part of the tonsil, as this portion is often pendulous, and, being situated low down in the pharynx, may escape observation, unless due care is taken. The right hand will hold the instrument, whichever side is operated upon, and the tonsil can be held firmly in toward the pharynx by outside pressure of the left hand. There is thus, under cocaine anaesthesia, no necessity for the presence of an assistant.

Although the tonsils can often be removed without the aid of reflected light, yet when it is available it is always better to use it. The operator, seated directly in front of the patient, can by its reflection see the parts much more clearly and adjust his instrument with more precision than he otherwise could.

In cases among children, in which general anaesthesia is required, ethyl-bromide or nitrous oxide may be administered in the method already mentioned. And in view of the experience of other men, and in the light of history, I earnestly recommend one of these drugs to be used.

Still, in my own practice I have heretofore used chloroform in these cases, the method being to have it administered *per gullatim*, and not to give sufficient to produce very profound anaesthesia.

The child, when ready, is turned over on its side, with its face toward a good light and the tonsils removed in quick succession. The body is then rolled to nearly a prone position, the head being held over the side of the couch to allow for the escape of blood into the bowl beneath. In defence of my position I may say that in a professional experience of thirty years, and covering thousands of cases in which general anaesthesia has been required, for one operation or another, I have not seen a death occur from its use, either in my own practice or in that of any of my professional brethren.

Bleeding after tonsillotomy, although usually free, is rarely severe, lasting only a few minutes and gradually ceasing. A good many cases, however, have been recorded in which the hæmorrhage was alarming. This has almost invariably occurred in adults. Out of 70 recorded cases only 4 or 5 were younger than 10 years. With some exceptions, the bleeding occurred immediately after or within a few hours of the operation. Two of the former were in my own practice. One, a strong, plethoric, medical student, was attacked by secondary hæmorrhage on the fifth day, after overexertion. The other was the little 5-year-old son of a physician. In his case the bleeding came

on while sleeping in the early morning, four and one-half days after operation. In both cases the hæmorrhage was stopped with little difficulty.

It is fortunate that, with all these cases of bleeding, I have so far been unable to find a case recorded in which hæmorrhage from tonsillectomy has proved fatal.

Excision by means of curved scissors or bistoury is applicable to irregularly-shaped tonsils. Some operators go so far as to recommend the method for all cases. After cocainization, the tongue being depressed, the tonsil is seized by a vulsellum or toothed forceps, and aided by reflected light the growth is cut away. This method is most suitable to cases presenting irregular projections, to which the tonsillectome could not be applied.

The use of the cold-wire snare and also the galvanocautery-snare have each had their advocates, particularly on the ground that by this means hæmorrhage would be avoided. Whether on account of the difficulty in applying the wire, the pain of the operation itself, or the conical stump the operation is apt to leave, or all combined, this method has not been received with general favor.

One other method, operation by galvanocautery-knife, remains to be considered. In suitable cases, properly selected, no other instrument that I know of can do as efficient work. It is particularly suited to those irregularly-cloven tonsils which we often meet with. Foul secretions, loaded with pathogenic germs, form within the clefts; and oft-repeated attacks of sore throat, result in hypertrophy of irregular, parenchymatous masses. In the hard, hyperplastic tonsils of adult life the galvanocautery treatment can also be used to advantage. Cheesy masses are constantly forming within the deep and narrow crypts. By their presence they produce a good deal of irritation, and they can only be removed by direct pressure. Neither of these varieties are of a form to be seized effectually by the tonsillectome. They are probably also too hard or too fibrous to yield readily to either bistoury or scissors.

The ordinary method advised in such cases, when the galvanocautery is considered to be the proper instrument, is to make a number of punctures with the cautery-needle into the face of the tonsil, and after an interval of several days to repeat the operation. When the growths are very large, this method is said to take about twenty operations to effect a cure: no doubt a tedious and painful process to the patient.

It would seem reasonable to limit materially the number of operations and also the time required for the work. After thorough co-cainization each time the cautery-knife instead of needle might be used. The tip being bent at right angles to the blade, and then carefully avoiding the pillars and their union at the upper angle, the knife is passed at a bright-red or white heat from top to bottom of the structure to be removed. This is repeated several times, making parallel incisions as widely and deeply as the operator in his judgment believes advisable for the one operation. It is best in every case for the surgeon unaccustomed to this method of cauterization to commence cautiously until experience becomes his guide. It is not necessary, however, to limit the first operation to one tonsil. Both can be treated at each sitting. For several days mild sprays and light diet will be required. Then the operation can be repeated, and so on until the work is done. As a rule, three or four operations will suffice for complete removal of the offending tissue. The pillars of the fauces must remain uninjured, and a smooth tonsillar stump be left on each side as a result. In the submerged tonsil a similar method may be followed. The plica triangularis can also more readily be removed by electrocautery than by any other method; and it is advocated strongly by Pyncheon, with the one addition: that he draws out the offending tissue with a tenaculum each time before operating.

In performing necessary operations upon either nose or throat, it should never be the aim merely to give relief. While this is undoubtedly the most important object, the cosmetic effect should also be kept religiously in view. When Nature in her highest and most normal development leaves a symmetrical surface, the surgeon should endeavor to do so likewise, and the nearer we can restore the various organs we have to treat to the normal form and condition, the more surely we have performed our duty to our patient.

CHAPTER XLIX.

LACUNAR TONSILLITIS

THIS disease, as its name implies, is an acute inflammation of the lacunæ, or crypts, of the tonsils, attended by the deposit of whitish-yellow exudate at their orifices.

Pathology.—The morbid lesion consists of a catarrhal inflammation of the parenchyma of the tonsil, accompanied by a fibrinous exudation from the lining membrane of the lacunæ, filling them with little, pearly-white masses composed of leucocytes, fibrinous fibrillæ (Sokolowski), and epithelial cells, which appear visible at the openings of the crypts. As they increase in size they spread out over the mucous membrane, surrounding the mouths of the lacunæ, and, being soft and friable, are easily brushed away.

Regarding the possibility of mistaking this disease for diphtheria, Sendznak in 1896 investigated the subject very fully. In thirty cases which were histologically examined, all were found free from Klebs-Loeffler bacilli; four had Loeffler's pseudodiphtheria bacilli, but they were mixed with other pathogenic germs, while all had staphylococci, streptococci, or pneumococci, either single or combined, staphylococci being usually in excess. His concluding words are:—

"Relying on the clinical picture of the disease, and the results obtained by bacteriological investigations in my thirty cases, I maintain that the so-called follicular angina, or, better, lacunar tonsillitis, is clinically and histologically an independent pathological process, having nothing in common with true diphtheria. It is no doubt infectious, but we unfortunately do not know its specific virus."

The common title, "follicular tonsillitis," usually applied to this disease is not only discarded by Sendznak, but also by Wolfenden, Lennox Browne, and others. Wolfenden says: "The very term 'follicular' is really erroneous, since it is not the follicles of the tonsils which are affected, except in a very secondary manner and in a few cases. It is the tonsillar crypts, or lacunæ, which are the chief seat of the disease."

As a rule, both tonsils are affected simultaneously. The catarrhal affection extends to the pillars, palate, and pharynx also, and oc-

asionally spots of exudation occur on these parts. The cervical glands likewise become sensitive and in some cases enlarged.

Etiology.—It is generally believed to be a specific disease, dependent upon the access of micro-organisms to the tonsils in certain conditions of the system. While in some respects it resembles the exanthemata, it differs from them in being in no way protective against the possibility of future attacks.

Although the germ itself and its origin are still unknown, it is believed frequently to arise from the elements of putrefaction in defective sewers. This idea has originated from the fact of its prevalence in old houses, where drainage has been defective.

Sensitive inflamed throats with enlarged tonsils are fit subjects for infection. The spongy tissue with open crypts offer free lodgment for the invading bacteria; and, as a similar tonsillar hypertrophy frequently affects all the children of a family, all may be affected successively by the endemic infection.

Although more prevalent in childhood than in maturer years, it frequently occurs during the latter period. Sex has no special influence over it. As might be expected, it is more prevalent in the spring and fall than during other seasons of the year.

One peculiar feature that has been observed by rhinologists is the development of lacunar tonsillitis in from twenty-four to forty-eight hours after nasal operation, particularly when performed by galvanocautery. The theory has been advanced that the absorption of the germ might take place through the nasal wound, and the near proximity to the tonsils would facilitate its transition and the development of lacunar disease.

If the disease occurred equally after knife and saw operations, the theory would seem more feasible. As the galvanocautery, when it does not produce hæmorrhage, hermetically seals the wound, may it not arise from the fact that galvanocautery operations upon the nose are temporarily followed by œdema and more or less stenosis, resulting in mouth-breathing? The impact of the germs upon the crypts during the depressed vitality resulting from the shock of operation would naturally tend to inflammatory action in the organ so affected.

Symptomatology.—The onset of the disease is noted by a general feeling of chilliness, which may last for several hours, to be followed by febrile action, the temperature in some cases rising as much as three or four degrees. Pain in the back usually accompanies the development of fever. Together with the fever and pain, the throat

symptoms manifest themselves. There is dryness and irritation, followed by the formation of the lacunar deposit, accompanied by pain, upon movement of the tonsils, particularly in deglutition. In young children the systemic disturbance is sometimes very severe, the temperature rising, even though rarely, as high as 105° and ushered in by convulsions. With the high temperature there will be acceleration of pulse and also of respiration.

By the second or third day the febrile symptoms subside, and pursue a very modified course until the disease disappears, between the fifth and seventh days from its commencement. The throat symptoms persist until near the close of the attack, unless modified by treatment.

In severe cases albuminuria is not by any means a rare symptom. Formerly the presence of this complication, in exudative throat disease of any kind, was considered a positive indication that the disease was diphtheritic. This idea is now discarded, and, although albuminuria is more prevalent in diphtheria, the only positive evidence now acknowledged in favor of that disease is the presence of the Klebs-Loeffler bacillus. In regard to albuminuria, Wolfenden states positively: "That it is rarely absent in cases of acute tonsillitis."

Pneumonia and nephritis have supervened in rare instances, while orchitis and enlarged spleen are occurrences which have been known to immediately follow the tonsillar disease.

Diagnosis.—The only other disease it is likely to be confounded with is diphtheria. Some cases may so resemble mild diphtheritic disease that in simple clinical examination an error in diagnosis might occur, and, in fact, has frequently been made.

To examine the fauces thoroughly, reflected light, head-mirror, and tongue-depressor are all necessary. In lacunar tonsillitis the gland is red and swollen, while, at the mouths of the lacunæ, clear, white, pearly spots will be seen, adhering closely to the mucous membrane beneath. These spots, as they develop, grow somewhat larger and extend outwardly around the mouths of the crypts, and can be brushed off with the cotton-holder without injuring the surface. They always retain their original color of bluish or yellowish white and are non-odorous.

In diphtheria the tonsil, although somewhat swollen, instead of being bright red is of a bluish, turgid color. The exudation forms an even flake, varying in thickness and covering the tonsil. In color

it is yellow or yellowish gray, and cannot be brushed off without leaving a raw surface beneath. On the second or third day instead of retaining its color, the margins assume a grayish-black tinge, and malodor is distinctly perceptible.

One other point in clinical history is of considerable importance: Acute lacunar tonsillitis is a sthenic disease with high febrile action, whereas diphtheria, the graver disease of the two, is asthenic and marked by a lower temperature. Both are infectious, but diphtheria is the more virulent of the two. Still, in all cases, where there is the slightest doubt in diagnosis it is better to submit the exude to microscopical examination. The history of the case should distinguish it from the throat eruption of the exanthematous diseases, also from cancer and syphilis.

Prognosis.—This is usually favorable. The disease runs a regular course of four or five days or a week, and, although it may be attended by considerable pain and fever, it is not likely to leave any serious complication after it subsides. The albuminuria which occurs is usually mild and of short duration. Paralysis of the palate has in a few instances followed the disease, lasting at the longest only a few weeks. Quinsy has also been developed as a result of the tonsillar irritation.

Treatment. Attention to hygienic rules, abundance of light diet, and regulation of the alimentary canal are all that seem to be required in many of these cases. While the fever is high and the bowels constipated, saline cathartics are indicated. Upon the hot and irritable throat alkaline sprays have a grateful effect. Among the internal remedies none have a better reputation than tr. fer. mur., 20 per cent. in glycerin, in doses of 1 to 2 grammes every one or two hours. It is given undiluted, its efficacy as a systemic tonic being aided by the direct contact of the iron upon the tonsillar exudation.

In my own cases I have not administered the iron in this way, but have diluted it very freely, in order to avoid any injurious effect the chloric acid might have upon the teeth of the patient. To free the tonsils the ferric glyceride was applied twice a day to them by means of a cotton-holder.

In many of these cases I have seen advantage from the sedative and astringent effect of nitrate of silver, applied in the early stage of exudation. The tonsils were first brushed with a 4-per-cent. solution of cocaine, followed in three or four minutes by the application of a 10-per-cent. solution of the nitrate. For the first hour the patient

would scarcely perceive any effect from the application. Then the sensation of soreness would only be slight. By the following day the deposit would be more than half of it gone and a second similar treatment would complete the removal. The diluted iron solution would be regularly administered internally, during the whole period of treatment, and, by the combined methods, the course of the disease would, in many instances, be materially shortened.

I have found the nitrate of silver particularly useful in that traumatic class of cases, the result of nasal operations, already referred to, quite frequently only a single brushing with the silver being required.

When there is much headache and insomnia $\frac{1}{4}$ - to $\frac{1}{2}$ -gramme doses of phenetidm or acetanild, given at bed-time, will often secure quiet and refreshing rest for the night; smaller doses to be given to children in proportion to age, of this as well as any other medicines required.

If there is much depression after the first two or three days, quinine may be resorted to, in $\frac{1}{4}$ -gramme doses once or twice a day.

The question of isolation in lacunar tonsillitis is one of no little moment. Whenever there is the slightest doubt as to the identity of the disease, there should be no hesitation upon the matter, and the patient should at once be placed out of reach of affecting others. When sure that we have not diphtheria to contend with, we may somewhat relax our vigilance, while care is taken to keep the patient aloof from those who would be most susceptible to the disease, knowing that the chief danger is from its endemic character, and not from the slightly-infectious nature of the exudation-deposit.

In treatment of acute lacunar tonsillitis I do not think the lance can ever be required. After the subsidence of the disease, however, if the tonsils are hypertrophied, tonsillotomy should be performed. This, in a large measure, would prevent the recurrence of the disease.

As an external application, camphorated oil, or a combination of spirit of turpentine and olive-oil, rubbed over the region of the tonsils, and the surface covered at once with a layer of absorbent cotton, always answers a good purpose.

CHAPTER L.

PHARYNGEAL MYCOSIS

Mycosis fungoides, a comparatively rare disease, when it does occur usually affects some portion of the fauces. It is termed "mycosis pharyngeus," "mycosis tonsillaris," "mycosis lingualis," etc., according to the mucous membrane affected. But as it extends, in most instances, to all these localities, being rarely confined exclusively to one site, the title at the head of this chapter may be considered the best (Fig. 83).

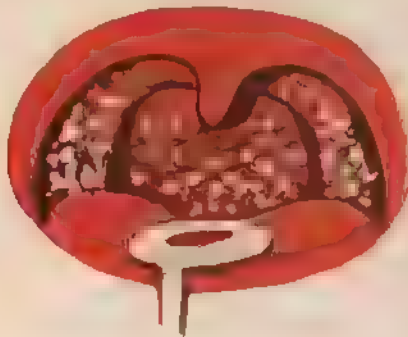


Fig. 83. Pharyngomycosis. (Author's specimen by Winch.)

Pathology.—The term mycosis, from the Greek word *μύκης*, signifying fungus, indicates the character of the plant. This is a parasitic disease, composed of small, whitish-yellow growths, dense in structure, and projecting above the mucous membrane upon which they have grown. It belongs to the schizomycetes group of fungi; and the species is called *leptothrix*, from the cylindrical, or thread like, shape of the cells. The term is applied to a variety of vegetable organisms found in drains, garbage, bogs, etc. They may also be found in milk, urine, and foul watery solutions, after prolonged exposure to the air. The microscope reveals the thread, or rod-like, cells of the *leptothrix* unbedded in amorphous granules, streptococci,

etc. (Figs. 84 and 85). If treated with Lugol's solution, these bodies assume a bluish tinge, indicating the presence of starch. The cells

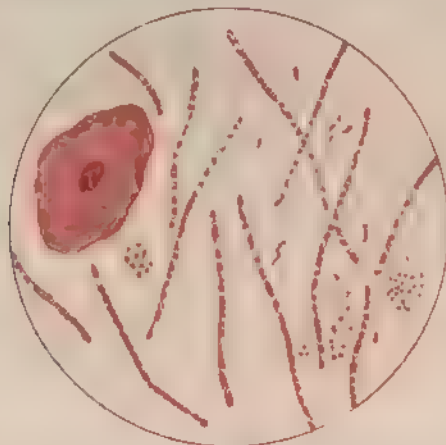


Fig 84—*Leptothrix*. Adventitious follicle to left side.
(Author's specimen by Bensley.)

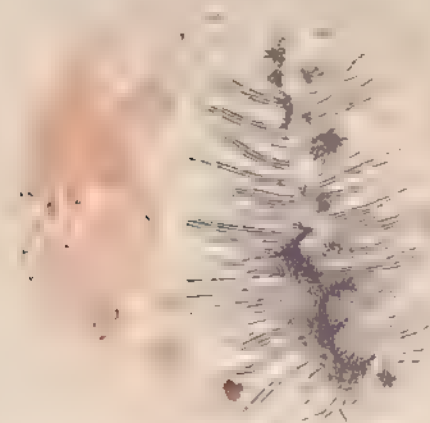


Fig 85—*Leptothrix in situ* $\frac{1}{2}$ inch objective.
(After Lennox Browne.)

vary in form according to the anatomical region from which they are removed. When the fungus appears on the surface of the mucous

membrane, it may be purely superficial, or be inserted in a wedge-shaped manner in the parenchyma. In the one it is simply attached *en masse* to the flattened epithelium, and is homogeneously striated in appearance (Bosworth). In the other, when it penetrates deeply into the epithelium, the growth is denser and more granular, and the microscope sometimes fails to demonstrate the rod-like cells. Heryng believes that this obliteration is caused by the pressure. When the mycosis enters still deeper into the crypts, the latter become dilated and filled with fungous growth, degenerated epithelium, and amorphous matter. Sometimes a horny hypertrophy of the epi-

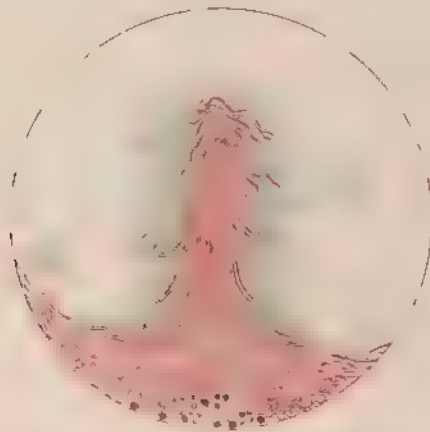


Fig. 86. Keratosis of tonsil with leptothrix ($\frac{1}{4}$ inch objective).
(After Lennox Browne.)

thelial cells, instead of simple catarrh of the crypts, acts as a base for the leptothrix, forming a keratosis of the tonsil (Fig. 86).

Etiology.—The original source of the fungus is still a matter of question. The microscopical examinations of Toepfitz, Wagner, Damaschino, Cohn, and others have proved, however, that the leptothrix is frequently found in the mouth, abiding there, like many other germs, innocuously, but that a condition of impaired health, together with idiosyncrasy of constitution, would appear to be required to secure the attachment and growth of the fungus within the pharynx. The peculiar feature is that, although the bacteria may be present in such large numbers within the oral cavity, they should so rarely find a *nidus* for development there, and should prefer the

faucal region. Perhaps the intense muscular activity of the mouth itself may act as a deterrent to leptothrix attachment. Sex has little, if any, influence. It rarely occurs before early maturity, and not very often in old age. Colin says the period of life liable to attacks is between the ages of 20 and 30 years.

Siebenmann (*Zeitschr für Laryngologie und Rhinologie*, 1895) has a long article upon this subject. On histological grounds he strongly combats the theory that pharyngomycosis owes its origin to the presence of the leptothrix. He first describes the microscopical appearance of a single quill of the disease and then a section of the tonsil with quill *in situ*. The examination shows the mass to be made up of a cyst, or sack, composed of a central narrow lumen surrounded by an epithelial wall. He compares it with the human hair in structure. The wall of the quill is partially composed of hardened unnucleated epithelial cells, and partially of homogeneous horny substance. The central lumen is narrow and filled with *debris*, bacteria, and mucus. The outer surface of the quill as it projects from the crypt is covered with bundles of leptothrix. He says that in the neighborhood of the crypt there is no evidence of inflammation, such as hypertrophy of connective tissue and small, round-celled infiltration.

As the result of his investigations he concludes that the process is an unusually intense cornification of the lacunar epithelium, terminating in quill-formation. He also says that keratosis of the tonsil-crypts in a mild form is not an uncommon condition, and that the presence of the leptothrix is purely incidental, and bears no relation to the disease as a causative factor.

The *Leptothrix buccalis* is a saprophyte, or fungus, found in almost every mouth—the more richly where the epithelial cells are thickest. Basing this theory on the absolute demonstration of the epithelial formation of the quills, with the manifestation of the leptothrix-spores only on the outer surfaces, Siebenmann considers his case clearly demonstrated, and desires the name of the condition to be changed to that of "Hyperkeratosis Lacunaria."

Richardson, of Washington, from pathological examination and clinical experience, also strongly favors Siebenmann's view.

The ages of all the cases I have seen are the following: 17, 19, 22, 26, 28, 30, 40, 55, and 60 years. The last two occurred in the same gentleman, with an interval of between four and five years of entire freedom from the disease. The second case was that of a girl working in a brush factory. She stated that the dust from a cer-

tain kind of bristles always produced soreness of the throat, which eventually developed into this disease. The sixth case is also worthy of mention. The patient was a young farmer. Two years before I saw him with the mycosis he came from a distant town to be treated for antral disease. After some weeks' treatment a complete cure was accomplished and he returned home. One year and a half later he spent the winter polishing cow-horns, during which time his throat became sore. In the spring he came again for treatment. On examination I found the whole of the tonsils, lower pharyngeal wall, and base of the tongue covered with the *leptothrix* fungi. There was no return whatever of the antral disease. In the fifth case the first indications occurred during the fourth week of an attack of typhoid fever.

Symptomatology.—When situated in any portion of the fauces, mycosis presents very few subjective symptoms. It produces no inflammatory action, and is causative of stiffness more than soreness. When the eruption is very abundant, a feeling of irritation may, however be developed. As the plants increase in number, and become scattered over a larger area, the movements of the pharynx become somewhat restrained, and the muscles slightly stiffened, partial dysphagia being the result. Occasionally, too, a slight irritable cough may be produced; but these symptoms are never marked.

The most frequent site, and where it presents the largest development, is in and between the crypts of the faucial tonsils, next on the lingual tonsil, on the walls of the pharynx, and last upon the pharyngeal tonsil itself. Siebenmann and Schabert both recite cases in the latter region; but the growth in these was *aspergillus* instead of *leptothrix*. I have only seen one case of development in the nasopharynx, and that was an extension upward from the faucial region.

Mycosis, when examined, presents small, milk-white opaque masses projecting above the mucous membrane. They are soft and moist in appearance, but are not easily moved. Colin describes three forms of development: 1. Small isolated spots. 2. Larger spots like a cock's comb. 3. Small, smooth, yellow-white *plaques*. Whatever form they take or wherever they are located, particularly in the keratotic variety, they will stand a large amount of friction without separating their attachment. Usually a large number of the plants are scattered over the area affected, varying in size from a millet-seed to a shelled oat-seed or larger. Sometimes they exist for years, presenting few symptoms of a distressing character.

Diagnosis.—On a casual inspection it might possibly be mistaken for diphtheria; but a careful examination should at once remove doubt in this direction.

The only disease to which pharyngeal mycosis bears any resemblance is lacunar tonsillitis, but in distinguishing it there should be no difficulty. The one is a sthenic inflammatory disease of limited duration; the other, non-inflammatory, asthenic, and essentially chronic. In the one the cryptal deposit is soft and pultaceous and easily removed. In the other the firm leptothrinx development adheres tenaciously to any part of the tonsil or pharynx upon which it may have grown.

Possibly, too, that chronic condition of the tonsil in which cheesy deposits form within the lacunæ and protrude above the surface might be mistaken for mycosis. Here both the diseases are chronic and non-inflammatory; but the cheesy masses only appear at the mouth of the crypts, never anywhere else; and they are easily pressed out, while the mycosis is scattered in every direction and cannot be so easily moved.

Prognosis.—In pharyngeal mycosis there is nothing dangerous to life; and a number of cases, after existing for years, have been known to disappear spontaneously, without treatment. It is only in exceptional cases that the disease is very distressing; still, as a rule, it is interminable in continuity, and if left to itself might last throughout a life-time. This long continuance undoubtedly has a depressing effect upon the vital forces, and may render the subject more susceptible to the influence of other diseases.

Treatment.—The treatment consists in the eradication of the plant. In a few recorded cases this has been done with facility; but, in the majority, careful, vigorous, and persistent treatment has been required for a prolonged period before complete cure has been obtained. Tincture of iodine, tannic acid, nitrate of silver, solution of bichloride, calomel insufflations, have all been used with more or less efficacy. Chromic-acid cauterization has its advocates, and also curettage.

But, of all methods, the galvanocautery needle, carefully inserted directly into each fungoid deposit, is generally acknowledged to be more positive in its results than any of the other methods of treatment. This will probably necessitate a large number of sittings, the use of cocaine or eucaine being in each required. Like all other methods of treatment, the cure will be tedious; but it has the

advantage of permanency in results. A cure can be accomplished, and, once cured, the disease rarely returns. During the intervals between operations the throat should be treated by antiseptic sprays, two or three times a day. Of all that I have tried, nothing seems to have so effective an influence in controlling the development of the new spores as a solution of izal. This is a coal-product, one of the new hydrocarbons, and said to be much stronger than carbolic acid in its germ-destroying influence. The preparation I have used is a 10-per-cent. aqueous solution.

CHAPTER LI.

HYPERTROPHY OF THE LINGUAL TONSIL

HYPERTROPHY of the lymphatic tissue, situated at the base of the tongue, in the glosso-epiglottic fossa, is not of infrequent occurrence. This mass of muciparous glands, called the lingual tonsil from its



Fig. 87. Hypertrophy of left lingual tonsil.
(After Lennox Browne)

similarity in structure to the faucial and pharyngeal tonsils, is in many instances abnormally developed, giving rise to a morbid fullness and irritation, which are both distressing and somewhat painful to the



Fig. 87a. Bilateral hypertrophy of lingual tonsil.
(Author's specimen)

patient. The condition may be either unilateral or bilateral (Figs. 87 and 87a).

Pathology. This mass of glands extends from the circumvallate papillæ to the epiglottis. It is divided into two halves by the medio-

glosso-epiglottic ligament. When in a state of hypertrophy, the glands may grow to an enormous size, and become packed closely together from side to side, over the base of the tongue. They are frequently accompanied by the development of large veins, coursing between the lymphoid tissue and the papillae, forming the lingual varix. Singers are somewhat subject to this disease, women particularly (Fig. 88).

The main difference between hypertrophy of the lingual tonsil and of those already mentioned is that, while the latter are largely



Fig. 88 Lingual varix (Author's specimen by Wrench.)

incidental to childhood, the enlargement of the former rarely develops before maturity. The growth is in the form of a broad layer of crypts or follicles over the base of the tongue; beneath and between these large blind lymphatic bodies are developed, inclosed in fibrous capsules (Fig. 89). The combined tissues enlarge until the sulcus between the tongue and the epiglottis is, in some instances, completely filled.

Etiology. This hypertrophic condition occurs more frequently in females than males: the reverse of the history of faucial tonsillar

hypertrophy. Bosworth suggests that it occurs much more frequently in young children than is generally supposed, not being recognized from the fact of the comparative insensitiveness of the throat during early life. Constitutional dyscrasia may in this, as in other hypertrophies, have much to do with its primary development. Not infrequently it occurs as a sequel to diphtheria, scarlet fever, etc. People addicted to the excessive use of spices, condiments, alcohol, etc., are also prone to the disease, owing to the hyperæmia produced by their irritative action upon the post-lingual region. According to Ray, the disease is of frequent occurrence among singers.

Symptomatology. — Lennox Browne describes three forms of chronic inflammatory disease of the tonsils: 1. As simple lymphoid or catarrhal inflammation. 2. Lacunar inflammation. 3. Parenchy-

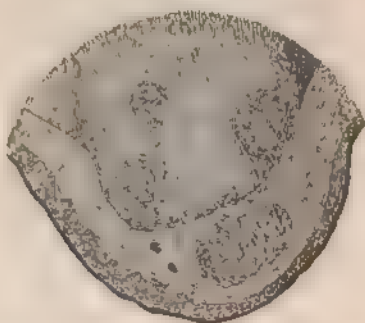


Fig 89 Microscopical section of lobe of lingual tonsil
(Author's specimen)

matous inflammation, sometimes ending in abscess, but usually in hypertrophy.

Whatever the form may be, the disease is almost invariably chronic, and of a secondary character.

Not infrequently chronic hypertrophy and lingual varix are associated together, while in not a few varicose veins will be present, without lymphoid enlargement. The prominent symptoms are the sensation of a foreign body in the throat, unrelied by swallowing, and, when the growth is large, accompanied by a feeling of constriction of the lower pharynx. There is often a reflex irritable cough, a constant endeavor to clear the throat, laryngeal fatigue, and also occasional hoarseness. In speakers and singers the voice soon tires and loses volume. In many instances the lingual is associated with

faucial hypertrophy. When varicose veins are present hæmorrhage is often a prominent symptom, occurring usually in the morning.

Diagnosis.—So many throat diseases produce symptoms similar to those of hypertrophy of the lingual tonsil that to insure a correct diagnosis a thorough throat examination should always be made. In some cases this can be accomplished by the use of the tongue-depressor without further aid. But these cases are rare, reflected light and throat-mirror being, in most instances, required.

A mass of mamillated tissue will be seen on the base of the tongue, stretching from side to side and divided in the centre by a longitudinal depression, indicating the position of the glosso-epiglottic ligament. Sometimes the hypertrophy of tissue is so great that it fills in the glosso-epiglottic notch completely, even overlapping the epiglottis itself, when in the upright position (Figs 87 and 87a).

Prognosis.—This disease involves no danger to life and but little to the general health. Still, having once developed, there is little likelihood of amelioration of symptoms, as the growth is slowly progressive, remaining for years without any tendency to shrinkage or change. In the case of varix, the condition is more serious, as the frequent hæmorrhages which are occasioned by it are debilitating to the constitution.

Treatment.—Topical applications of iodine, glycero-iodide, solution of acetic acid, chromic acid, etc., have all been used with more or less effect. Still, it must be remembered that the growth is essentially one of mature years, and the firmness of its texture renders it little amenable to mild methods of treatment.

The object aimed at should be removal of the hypertrophied tissue, whether lymphoid or varicose or both. This can be done in various ways. Some authorities advise excision by curved scissors or bistoury. Others by the galvanocautery-écraseur or the cold-wire snare. The operation, however, which has been received with the greatest favor and is the most largely practiced, is by the galvanocautery-knife or electrocautery-knife.

In any case, the parts should be thoroughly cocainized, and the operation should be performed by aid of reflected light. The objection to either of the cutting operations is the possibility of inducing severe hæmorrhage and the difficulty of controlling it in such an obscure situation. When the surgeon decides to operate by either bistoury or scissors, it is better to commence tentatively, and not to expose too large a surface of raw tissue at one operation.

Operation by the hot platinum snare I have had no experience with, but would expect the same difficulty in applying it to the broad base of the growth in this as in other situations. I have used the cold wire snare on two occasions only, for removal of hypertrophied lingual tonsil. In the first the operation and result were both satisfactory. In the second, the patient was a young man aged 30. The growth had been developing for a good many years: a fact that I did not know until the snare was tightly drawn around it. Then the closest traction I could put upon the wire failed to sever the tonsil. Fortunately for the patient the parts were well cocaineized. After trying ineffectually for a quarter of an hour to tighten the wire



Fig. 300. Roe's lingual tonsillotome.

enough to cut through the tissue, I was obliged to sever it beneath the snare ring by means of curved scissors. This is a difficulty in using the cold snare which, perhaps, is not sufficiently realized. As in the nose, so in the throat, we should make sure that we do not grasp on the guilotine any tissue, bony or fibrous, that the wire cannot readily sever.

The galvanocautery operation, for both operator and patient, I have found in many cases to be the best. The electrode should be curved to escape touching the body of the tongue, and, the parts having been cocaineized, a number of the larger nodules may be touched freely at the first sitting, the patient grasping his tongue and

holding it by means of a napkin, held by the fingers of one hand. After an interval of several days the operation may be repeated, and so on until the hypertrophy is all removed. Healing quickly takes place. There is no hæmorrhage. The suffering is not severe, and, as a rule, a very few treatments will suffice to restore the parts to a normal condition. Food should be bland and light. Demulcents are grateful, and mild antiseptic alkaline sprays are soothing during the process of healing.

Some years ago Roe, of Rochester, invented an instrument specially adapted for the removal of enlarged lingual tonsils (Fig. 90), and since then various modifications of his original design have been brought out by different writers.

CHAPTER LII.

BENIGN TUMORS OF THE PHARYNX.

PAPILLOMA.

NEOPLASMS of several kinds occasionally affect the different portions of the pharynx. Still, they are all comparatively rare. Probably papillomata are of the most frequent occurrence. The usual site is on some part of the soft palate, particularly the uvula. Occasionally they may be found on one of the pillars of the fauces, but rarely on the pharyngeal walls.

They are little, firm, warty growths. Sometimes, though rarely, they develop to the diameter of a centimetre, and present a cauliflower or mammillated surface. They are whitish and glistening in color, and microscopically exhibit the usual characteristics. They are composed of connective tissue, each papilla being supplied with its own blood-vessel and coated over with epithelium.

No special symptoms are produced by them. They are always painless and rarely give any discomfort. When very large, particularly if attached to the uvula, they may produce cough and irritation to some slight extent. Still, they are rarely looked for, and almost invariably are discovered by accident.

Treatment is simple. It is merely to snip them off close to the surface by scissors or to seize them by the forceps and cut them off at the base by a small, sharp-pointed bistoury. When properly removed they evince no tendency to return.

FIBROMA.

Fibroma of the pharynx is much rarer than papilloma. Occasionally this growth may develop on the soft palate or tonsils. It consists of similar fibrous tissue to fibroma in other parts, and follows a similar history in development. The disease occurs most frequently in the tonsil.

Fibrous neoplasms usually occur in adult life. They give rise to few symptoms, the main features being those attending obstruction,

when the growth has attained any large size. Not infrequently the discovery of the fibroid tumor has been accidental, the use of the throat-mirror, when applied for some other purpose, rendering its presence apparent. The pinkish-white color, rounded or nodulated form, and dense resisting consistency are prominent features, and should render the diagnosis certain. They are also less liable to be attended by hæmorrhage than fibromata of the naso-pharynx.

Operative treatment is the only method worth speaking of. If the growth is once thoroughly eradicated, it is not likely to return. If it is not removed, it will go on growing, displacing surrounding tissues and promoting their absorption; and there is possibility of its ultimately degenerating into malignant disease.

Treatment should be by evulsion. Sometimes the guillotine may be passed round its base, and, as fibrous tumors are liable to be attended by hæmorrhage, this is an excellent plan of removal, when possible. In others, the tumor may be seized by tenaculum or forceps, and, having been drawn out to the tension-point, the attachment may be severed by scissors or bistoury.

I have seen one case only. The patient was a barrister 48 years of age. The growth was sessile and located in the left tonsil. It was whitish pink in color and accompanied by occasional shooting pains up to the ear and down to the larynx. It gradually increased in size and commenced to interfere with speech, causing weariness and pain after a long address. In this case I removed it by repeated galvanocauterizations. The treatment was completed three years ago, and there has been no return.

Besides pure fibroma, other varieties of neoplasms of a combined character are sometimes found in the pharynx. Such as fibrolipoma, a combination of fibrous and fatty tissue; fibrochondroma, a union of fibrous and cartilaginous; fibrolymphadenoma, containing the fibrous and lymphatic elements combined. But they are all exceedingly rare, and their history and treatment differs little from that of fibroma in its simple form.

Mention should also be made of adenoma of the palate, which somewhat resembles fibroma in history and appearance, though much slower in development: and also of angioma, which in rare instances has been known to affect the palate as well as the base of the tongue. In the latter removal may be by the means already mentioned, the chief danger in operation being from hæmorrhage. This may be controlled by galvanocauterization at a dull-red heat.

DERMOID TUMORS.

One other variety of tumors, the dermoid, is occasionally found in the pharynx. They are the remains of defective or superfluous development in embryonic life. Arnold has gathered a list of thirty-eight dermoid tumors of the fauces. Seventeen of these occurred in premature still-born infants, while a large proportion of the remaining ones died within a day or two of birth. Still, a number of cases have been recorded in which children have lived for a length of time with the dermoid tissue still present, and several have arrived at adult age without having it removed.

The tumor is formed of ordinary integument, is attached by pedicle, and contains sweat and sebaceous glands, as well as hair-follicles. In it there is nothing dangerous to life; and the large mortality incident to its development has been due to vital insufficiency independent of the growth. Only mechanical symptoms are produced by it. The surface is soft and white. Sometimes hair is visible, and the appearance is that of ordinary skin moistened by the secretions of the throat.

The treatment is simple removal by scissors or whatever other instrument appears most suitable for the case. There is no tendency to reformation after complete excision.

CHAPTER LIII.

TUBERCULOSIS OF THE PHARYNX

Of all forms of miliary tubercle, that of the pharynx is the rarest. While one-seventh of the population of civilized countries die of pulmonary tuberculosis, it is roughly estimated that not more than 1 per cent of these are ever affected by pharyngeal tubercular disease. One noticeable feature about it, however, is its peculiar virulency when developed in the faucial region. When in the pharynx, although usually considered an asthenic disease, it is, in the majority of instances, sthenic, severe, and rapidly fatal.

Pathology.—Whether in the larynx or pharynx, the pathological changes very much resemble each other. At the commencement and throughout the disease there is a peculiar pallor of the surface. The first deposit of gray nodules is usually in the soft palate, upon an abnormally-gray mucosa. With this there may be infiltration and the presence of tubercle bacilli. By and by the nodules break down, and shallow, irregular ulcerations, with ragged edges, take place, which may coalesce and form extensive surfaces of tubercular disease. The tonsils are more rarely affected. The larynx is usually invaded almost synchronously with the pharynx.

Etiology.—Pharyngeal tuberculosis is very rarely a primary disease. At all events, it is recognized, as a rule, to be a secondary development, following the manifestation of tuberculosis in some other organ or organs. Unlike the disease in the lungs, or even in the larynx, it is assumed by its presence to indicate the existence of general tuberculosis in other organs of the body. Its rapid clinical history would seem to bear out this view. As a rule, it is a secondary development to pulmonary disease. Abercrombie and Gee reported cases following tubercular enteritis; and, even though not primarily recognized in other organs, it is doubtful if it is not present, though in a latent form. Still, there appears to be no reason why a primary deposit of tubercle is not possible in the fauces as well as in any other region of the body, and a number of cases have been recorded in which this seems to have been the case. Lennox Browne has reported

two cases in which the mouth and fauces were affected with tuberculosis between two and three years before there was any manifestation in the lungs.

Symptomatology.—Apart from the general constitutional dyscrasia, which would indicate the presence of tuberculosis, perhaps the first directly-pharyngeal symptom which would be noticed would be pain in the act of swallowing or speaking. This is of a sharp, lancinating character, and is accompanied by chilliness and increased temperature, often rising to 103° and 104° . The oedematous condition of the palate interferes seriously with deglutition. Food will pass up into the nose, and secretions will accumulate within the pharynx, owing to the stiffness and incompetence of the palatal muscles. Cough is always feeble and accumulations difficult to void. The voice, although muffled, does not lose its tone, unless the tongue is affected: a condition which frequently takes place. Difficulty and pain in deglutition materially interfere with the proper nourishment of the body. Examination of the throat reveals the pallid condition of the surfaces, and the presence of granulation, infiltration, or ulceration variously combined, according to the condition of the parts affected.

Diagnosis.—This should not admit of any great difficulty. There are two well-recognized stages in the history of faucial tuberculosis. In the first the mucous membrane is unbroken, but beneath its surface, on close inspection, minute grayish-white spots may be observed. They are about the size of mustard-seed, and may be scattered pretty extensively over the parts affected. There is also slight infiltration as well as anemia of the mucosa. The spots are greenish or muddy colored, quite different from the clear, white spots of lacunar tonsillitis. In the second these nodular spots of tubercular deposit in a very few days break down into true ulceration, of the type peculiarly characteristic of tuberculosis.

There is probably only one disease with which tuberculosis of the pharynx is likely to be confounded, and that is the ulceration of syphilis. Still, the local conditions manifested by the two diseases are strikingly different. In syphilis the ulcers are clear cut, deeply excavated, with bright-red irritable areolæ, and bathed copiously in yellow pus. In tuberculosis the ulcers are shallow without any well-defined margins, without areolæ, slowly progressive, and with limited discharge of grayish mucus. In syphilitic ulceration there is no fever; in tubercular ulceration fever is well marked. Tuberculous granula-

tions are indolent and pallid, while syphilitic granulations are larger and inflammatory.

Lupus, being essentially a chronic, non-febrile disease, could scarcely be mistaken for tuberculosis. It is also more nodular, less painful, and given to vigorous cicatrization, to which tuberculosis is unknown.

Bowlby relates a case of extensive pharyngeal tuberculosis in which the membrane was so extensive and thick and gray as to suggest the possibility of diphtheria, while Walton reports one in which the hard palate was perforated into the antrum of Highmore, rendering a possibility of mistaking it for malignant disease.

Prognosis.—This might be pronounced a hopeless disease were it not for the fact that a very few recoveries under favorable circumstances have been reported. It is one of the most acute of all tubercular affections, usually terminating in a fatal result in a comparatively short space of time. As it rarely occurs except as secondary to extensive tubercular disease elsewhere, it only adds fuel to the existing fire. Still, when the nodules were limited to a small area, or a small ulceration existed without surrounding nodular deposit, cases have occurred in which prompt treatment has removed the local disease and healing has taken place. These patients might ultimately die of tuberculosis, but they were cured of the pharyngeal disease.

Treatment.—On general principles, it is better to keep the parts free from discharges by the use of cleansing sprays. These should be of a mild character to prevent irritation; 20-per-cent. solution of peroxide of hydrogen answers this purpose very well. As does also a 5-per-cent. solution of resorcin. Dobell's solution answers a good purpose likewise, without possessing as much antiseptic power as those already named. After cleansing, cocaine might be applied, and the ulcers rubbed with a 50-per-cent. solution of lactic acid. This is after Krause's method of treatment of laryngeal tuberculosis. The application may be repeated at intervals of two or three days, and may be carried out in buccal as well as pharyngeal tuberculosis. In regard to the latter, I have seen excellent results in a case of extensive sublingual tubercular ulceration. This occurred in a man, aged 35, suffering from severe apical disease. The treatment extended over six months and the ulceration healed, leaving the tongue somewhat limited in projectile movement. The pulmonary tuberculosis steadily advanced, resulting fatally the following year.

Of newer remedies, the application of guaiacol to the ulcerations

has been productive of good results. The same may be said of sulpho-reinate of phenol, parachlorophenol, and enzymol. The latter is recommended by Murray as acting in like manner with lactic acid.

A 5- to 10-per-cent spray of menthol in albolene, or a similar preparation used by an oro-inhaler, would have a soothing and cleansing effect upon the diseased tissues.

Another method of treatment of pharyngeal tuberculosis is by curettement and lactic-acid treatment combined, as advocated by Heryng. If the physical strength of the patient is not too much impaired, destruction of the ulcerative tissues by galvanocautery may, in some cases, check the progress of the disease.

After cleansing or operation frequent dusting by iodoform has also been found of benefit.

Internal medication may also be of benefit for the general tuberculous condition. For this no remedy at the present time possesses a higher reputation than creasote and its derivatives. Of the latter, carbonate of creasote, or creosotal, probably takes the first place, inasmuch as it can be taken in larger doses than any of the others without injury to the digestive tract; doses of 1 or 2 grammes can readily be taken two or three times a day, either in cod-liver-oil or on sugar. Other systemic tonics and ferruginous medicines may also be prescribed in suitable cases, while the dietetic, hygienic, climatic, and other conditions of the patient are carefully attended to.

CHAPTER LIV

LUPUS OF THE PHARYNX.

LUPUS of this region, as well as lupus of the skin, nose, or larynx, is a very chronic disease. It is a rare disease, slowly progressive in character, and marked by nodular development and infiltration. Although in the large majority of instances, lupus attacks the skin in preference to the mucous membrane, cases do occur, occasionally, in which the latter is the primary seat of the disease.

Pathology. Lupus differs widely both in clinical history and appearance from local tuberculosis; yet the presence of the tubercle bacilli in each proves that a close relationship exists between them, and a close investigation will reveal the fact of a tuberculous con-



Fig 91.—Lupus. Palatal appearance (After Lennox Browne)

nection in the majority of cases. The soft palate or one of the faucial pillars is usually the part affected first; and from this it slowly spreads to the soft tissues of the pharyngeal walls (Fig. 91). The development is that of nodular thickening, accompanied by slow ulceration, the peculiar feature of the ulceration being that, while there is destruction of normal tissue, there is little change of color and but scanty discharge of pus and *débris*.

The process of ulceration is accompanied by the compensatory formation of cicatricial tissue, which, when developed, twists and conorts the pharynx out of its natural shape.

This disease is rarely symmetrical, the lesions being more extensive on one side of the pharynx than the other; and the nodular infiltration always presents a characteristic, vascular, knobbed, and

irregular appearance. Though sometimes associated with tubercular disease in the other organs of the body, it most frequently occurs as an independent pathological condition (Figs. 92 and 93).

Etiology. It occurs more frequently in females than in males. Why this is the case is difficult to understand—the reverse being the case in tuberculosis, its kindred disease. The period of life most subject to it is between the ages of ten and thirty years.

A susceptibility to tuberculous invasion may possibly be one cause why the deposit of the bacillus tuberculosis within the pharynx

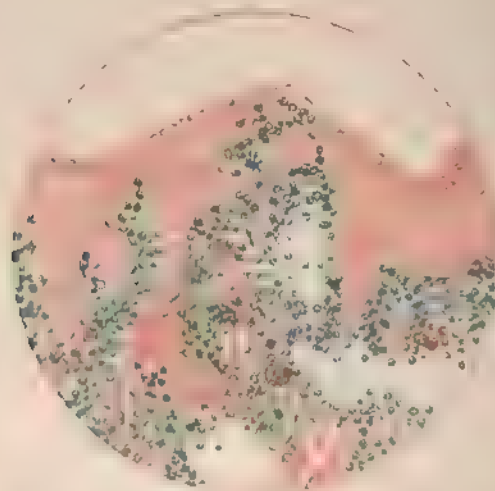


Fig 92 =Lupus of lingual tonsil ($\frac{1}{4}$ inch objective; Ehrlich Biondi stain). (After Lennox Browne)

may lead to its proliferation there as lupus; but why it should take on that form instead of that of the more prevalent disease, tuberculosis, is the question.

What special conditions are causative of its development in any given case are still unknown.

Symptomatology. It is rare for lupus of the pharynx to be recognized in the initiatory stage, as it always develops slowly and almost without symptoms. Semon recently reported a case of extensive lupus of the pharynx and larynx in which there had never been the slightest pain, although the voice had been destroyed for months.

Stiffness of the throat and sluggish motion of the parts are among the earliest symptoms. Later an ulceration develops, together with nodular enlargement and cicatrization. Deglutition and phonation may both be interfered with. When the palate is seriously involved, food can pass into the naso-pharynx and the nose during the effort of swallowing. Still, with painstaking effort, sufficient food can always be taken to sustain life.

Unlike syphilis, when the palate is affected, the buccal instead of the pharyngeal surface is usually the seat of the lesion when first observed. The appearance of lupus of the uvula is also peculiar. As

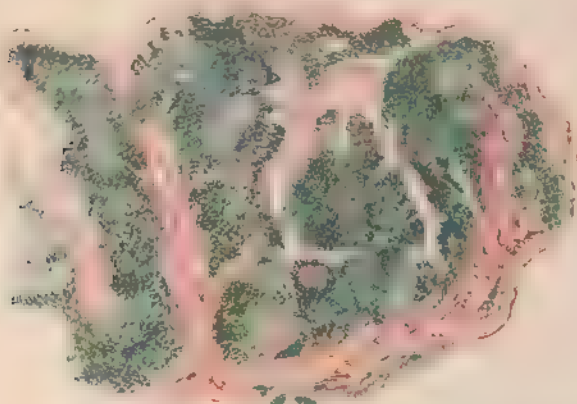


Fig 93 Lupus of lingual tonsil ($\frac{1}{2}$ inch objective; Ehrlich-Biondi stain). (After Lennox Browne.)

Lennox Browne describes it, the end of the organ is swollen, with solid infiltration, and club-shaped in appearance.

Diagnosis. One of the notable features of this disease is its prolonged, chronic, non-febrile character: the direct antithesis of its fellow, tubercular pharyngitis. The deposit is in the form of small nodules irregularly distributed, destroying the smooth regularity of the mucous membrane. When ulceration commences, it is always limited and accompanied by little discharge. The surface of the nodules, as well as the ulcerations, is of a red color. As the destructive process advances, cicatricial bands form, which are readily seen upon examination.

The pale-gray color of tuberculous ulceration should not be con-

founded with lupus. The color and objective form of the two diseases are entirely dissimilar, while the tenacious muco-pus of the tubercular process is quite distinct from the scarcely-noticeable discharge of lupus. The cachexia and fever of the one is also in striking contrast to the non-febrile, non-cachectic condition of the other.

From tertiary syphilis, with its broad, deep ulcer, sharp outlines, and copious purulent discharge, it should readily be distinguished.

With malignant disease likewise it has little in common. The pale, mottled surface of cancer, with its necrosis of tissue, frequent hæmorrhages, offensive discharges, etc., are characteristic of malignant, but not of lupoid, disease.

Prognosis. Serious and unfavorable as this disease always is, it is rarely of itself fatal. It is usually, however, only a complication of lupus of the head or face, and is sometimes only a prelude to the more serious affection of lupus of the larynx. Still, in all cases life may be prolonged indefinitely without apparent abbreviation by its presence.

Spontaneous cures rarely, if ever, occur. Yet there are sometimes, under favorable circumstances, quiescent periods in which for years little progress will be made, and in which there may be some improvement in symptoms, to be followed by a return of the onward march of the disease.

Treatment. As there is little secretion and likewise little pain, neither cleansing nor anodyne treatment is required in the majority of cases. The only treatment of any use is radical, either to remove it altogether or at least to check its progress.

The plan usually adopted is to scrape away as much of the diseased tissue as possible with a sharp spoon or curette, and then to brush the basic surface freely with lactic acid, the operation or brushing, or both, to be repeated at intervals of several days while required. Another method of treatment which has been received with a good deal of favor is by the use of the galvanocautery. Excision, too, is not without its advocates. Free cocaineization in any case would be necessary prior to operation.

Internal treatment by arsenic, codliver-oil, iron, etc., is also a useful adjunct to the operative procedure.

Hypodermic injections of Koch's lymph have frequently been tried, and the results received with more or less enthusiasm, in the history of many cases; though whether permanently good results have been accomplished in any of them is a matter of grave doubt.

CHAPTER LV.

SYPHILIS OF THE PHARYNX.

SYPHILIS of the pharynx is not by any means an infrequent event, and occurs during some portion of the history of the majority of cases of syphilitic disease. In rare instances it is primary, in a very large number secondary, and in a certain proportion of cases it occurs in the tertiary form.

Pathology.—Lesions, whether superficial or deep, are all of an inflammatory character, and partake largely of the nature of those that occur on the mucous membrane of the genital organs, modified only by the structure and functions of the special tissue upon which they occur.

When the primary disease, or hard chancre, appears in the pharynx, its usual site is in the tonsil, presenting similar pathological lesions to those manifested when it appears on the penis, only that they are of an aggravated character.

The secondary manifestations of syphilis which appear in the pharynx may be of different forms: 1. Erythema or passive hyperæmia. This is of venous character, as if the parts were congested by dark, sluggish blood. It does not occur until two or three months after the primary lesion. 2. Mucous patches. These are the most frequent of the secondary lesions; and appear about the same period after the initial disease. In the mucous patches there is dilatation of the blood-vessels over symmetrical areas upon each side of the soft palate, with effusion of serum and embryonic cells. There is increase of cell-proliferation, with exudation upon the surface, giving the peculiar whitish appearance which is so noticeable a feature of the mucous patch. 3. The superficial ulcer. This is another secondary manifestation of the presence of syphilis; but, as it is frequently the result of necrosis of mucous patch, it is not always a distinct manifestation.

The tertiary period of syphilis is marked by the development of gummata, which rarely appear before the fourth or fifth and sometimes as late even as the twentieth year of the disease. When they

occur in the pharynx the deeper tissues become involved. The growth forms rapidly, and, having limited vitality, breaks down quickly. Pathologically it resembles gumma wherever found, but, being situated in soft tissues, necrosis occurs earlier than when it is situated on cutaneous surfaces. Softening quickly and involving the deeper tissues, it forms the deep ulcer of tertiary disease, the depth of ulceration being always limited by the extent of the pre-existing gummy deposit.

The only other pathological conditions which need be mentioned here are those produced by cicatrization of the superficial and deep ulcers of syphilis. In the superficial the cicatrices are small, but characteristic, being stellate in outline, the fibres radiating from a central mass.

In the deep the cicatrices produce extensive deformity. They are formed of dense, inelastic bands of fibrous connective tissue. These bands undergo continual contraction, as though Nature were trying to draw the distant normal surfaces together. Not only do cicatrices form across the fields of ulceration, but abraded surfaces, as between the palate and post-pharynx or between the uvula and one of the faucial pillars, will come in contact and unite, resulting in permanent destruction of mucous membrane and more or less stenosis of the naso-pharynx.

Etiology.—Syphilis of the pharynx may arise from direct contamination, or as the result of secondary or tertiary disease in the system. It may occur as a primary lesion from direct contact of an infected subject by kissing or biting; from using towels, utensils, etc., infected by a syphilitic person; or from certain loathsome practices. Max Thorner recently reported a case of this nature, occurring in a married woman, the infection being directly produced by her wretch of a husband.

Secondary syphilis of the throat occurs in the majority of cases of constitutional syphilis, following the general trend of development of this disease in the marginal mucous membranes, or membranes near the physical outlets.

Tertiary lesions are produced by the constitutional disease. They are of frequent occurrence in long-standing cases and may arise from five to twenty years after the original primary disease. Secondary and tertiary lesions may also be hereditary.

Symptomatology.—The symptoms vary materially according to the stage of the disease in which they are manifested.

In the primary the chancre appears most frequently upon the tonsil. It is usually unilateral, but sometimes may occur on both sides. Jullien reports a recent case in which bilateral chancres of the tonsil occurred in a girl aged 17. They were caused from sucking the nipples of a syphilitic parent, recently delivered. The spongy, open condition of the lacunæ of the tonsils may be the reason for the more ready deposit of the virus in this region, but other parts of the mouth, the under surface of the tongue and the lip, sometimes become the site of the disease.

The first symptoms are those of severe sore throat, with pain in swallowing. The tonsil becomes swollen and red, and a white abrasion forms, with slightly-elevated edges. In a few days the glands of the throat swell and become painful.

Secondary lesions, whether as erythema or mucous patch, are usually symmetrical. Both eruptions confine themselves to the soft palate and pillars, and both show a sharp line of demarkation. In both there is stiffness of the throat and soreness. When the mucous patch is present there is acute sensibility, particularly in swallowing. Condiments, acids, and hot drinks produce sharply-distressing pain.

Tertiary lesions. The symptoms attending the development of gumma in the pharynx are largely mechanical, owing to interference in deglutition and phonation. Although the pain may be severe, it is not so lancinating as in certain forms of secondary disease. It is unlike the secondary, too, in being unilateral at its commencement, usually attacking one tonsil with the adjacent pillars or one side of the post-pharyngeal wall. Deep ulceration quickly follows the development of the gumma. It is speedy and extensive in its destructive action, presenting prominent and ragged edges around the margin of the ulcer.

When it remains unarrested, the destruction may be very extensive, involving the integrity of the palate and destroying the power of normal deglutition, food and drink finding an entrance into the nasal passages as a consequence. Hæmorrhage of a severe character rarely occurs. Perforation frequently takes place.

The symptoms arising from cicatricial deformity are almost purely of a mechanical character. Nasal stenosis, from closure of the faucal isthmus or adhesion of the palate to the post-pharyngeal wall, sometimes occurs. Cases are on record in which the cicatricial contractions were so severe that the naso-pharynx was entirely cut off from the oro-pharynx, and others in which the palate from side to

side became attached to the post-pharyngeal wall. In other instances the palate itself has been lost, giving the food an equal tendency to pass into the naso-pharynx as the œsophagus. Most of these deformities are irregular and of a one-sided character. They rarely affect the respiration when confined to the pharynx; but frequently the voice is changed from the normal.

Diagnosis.—Chancre of the tonsil presents the ordinary appearance of chancre of the penis, with the exception that it covers a wider area, involving the whole of the surface of the tonsil. The margin of the ulcer is indurated and the submaxillary and cervical glands of the affected side become enlarged and tender to pressure. The surface of the ulcer is granular, gray, and coated with mucus. Sometimes, though rarely, the lesion is small; it may then resemble more fully an ordinary chancre. It differs from gummatus ulceration in not being excavated.

In syphilitic erythema the chief diagnostic marks are the sharp line of separation from the healthy tissue, and the dark, diffused congestion of the mucous membrane affected by the disease. The soft palate and the faucial pillars are the parts usually involved, the post-pharynx not being touched by the lesion.

The mucous patch is of a bluish-white color, scattered evenly over the right and left sides of the palate and faucial pillars. Its line of demarkation is as closely drawn as that of erythema, and is one of the leading diagnostic features. The thickening at first is very slight; but, if the disease remains long without control, the patch becomes raised above the surface, the color more even and opaque, and the margin develops a ring of hyperæmia not before noticed. In some cases it becomes fissured, scaly, and hemorrhagic, resulting in superficial ulceration. Superficial ulcers are, as the name implies, shallow. They are usually ovoid in form, are sharply defined, and have little tendency to extend.

Gummy tumors are hard and often large. They are paler than the surrounding mucosa and not very painful. The diagnosis is often very difficult, as they may be mistaken for fibromatous or malignant neoplasms. In these cases specific medication should effectually establish the diagnosis.

Deep ulcers of syphilis are much more readily recognized than gummata. The edges are sharply cut, the ulcers deep and depressed, sometimes undercutting the surrounding mucous membrane. The marginal areola is very distinct. Pus is profusely discharged, and

neecroses of the ulcerated tissues is a prominent feature. As in superficial ulcer, there is little tendency to spreading beyond defined limits, while at the same time, except under specific treatment, repair is exceedingly slow.

The cicatricial tissues are recognized by the stellate and superficial character of the former, and the irregular, extensive, and deep-seated pharyngeal deformities produced by the latter.

Prognosis.—So far as life is concerned, it is only in the tertiary form that there is any tendency toward a fatal issue. It is, however, one of the most loathsome diseases and also one of the most contagious, and, if not relieved, productive of almost life-long misery of one form or another. The liability of the development of gummata and deep ulcerative processes throughout the different tissues of the body should never be lost sight of.

Treatment.—Constitutional treatment is an important factor in dealing with this disease, and should be carefully carried out in dealing with its various forms, particularly the two later ones.

In local treatment, whether primary, secondary, or tertiary, thorough and systematic cleansing is of the greatest value. This can be done by alkaline gargles or sprays. The latter when applied are the more effectual. When chancre of the throat exists, different lines of treatment are recommended by different authors, subsequent to the regular throat-wash, but their main objects are alike. Solutions of permanganate of potash, nitrate of silver, acetate of lead, chloride of zinc may any of them be applied to the ulcer by means of the cotton-holder; or the various forms of iodine powders—such as iodoform, iodol, aristol, etc.—may be dusted on the surface.

The question of removal of the chancre by excision, or of the hypertrophied tonsil upon which it may be located, is rarely seriously thought of now. The virus is already in the system when the chancre is found, and the production of a large raw surface in the syphilitic throat would produce serious danger of autoinfection.

Mucous Patch.—In this it is highly important to treat most thoroughly, the object being to destroy the mucous infiltration as early as possible. While the primary chancre is a self-limited disease, the mucous patch, unless removed, will go on indefinitely and may produce chronic throat-lesion. For this there is no better remedy than the application of nitrate of silver in strong solution, repeated on alternate days as long as the disease lasts, cleansing sprays being used during the intervals. Of other remedies that might be tried, iodoform

and glycestannin have both done good work, also tinct. fer. mur. in glycerin, 1 part to 4, painted on the surface three times a day.

In the ulcerations, superficial and deep, as well as the gummy tumor, besides the local cleansing and the application of the iodine compounds, already mentioned, the main thing is to get the system under constitutional control as quickly as possible, by the administration of the iodides. This treatment should be pursued with zeal, in every instance where a gumma is discovered, with the object of its resolution, before ulceration—with all its destructive results—can take place.

The successful treatment of deformities of the pharynx arising from tertiary syphilis is a very difficult matter. The most common deformity is adhesion, all or in part, of the soft palate to the post-pharyngeal wall. Although these adhesions may be severed, they are followed by renewal of the cicatrix, without special means are devised to keep the parts open by the use of suitable dilators; and, as the cases all differ from each other, each one must be judged and treated upon its own merits. When extensive perforations of the palate have taken place, obturators have sometimes been used to prevent the passage of food into the nose or naso-pharynx.

ACTINOMYCOSIS.

This disease, like glanders, is peculiar to the higher animals; but, instead of selecting the horse as its habitat, it has chosen the bovine race. Like glanders, too, it is communicable to man. In cattle the disease is known as "lumpy-jaw," and owes its origin to the "ray-fungus." It may be transmitted to man by contagion through an abraded surface, and from there carried by the lymph-vessels to the pharynx and tonsils.

The implantation of the ray-fungus leads to development of granulation-tumors, which result in inflammation, chronic suppuration, and formation of ill conditioned sinuses. The symptoms are those of local tumefaction and persistent purulent discharge. Pain is variable and is of a heavy, aching character. Sometimes the disease might be mistaken for sarcoma. The prognosis is bad, although early treatment might be of some avail. Large doses of iodide of potassium are said to have cured some cases. Nitrate of silver given internally has also been attended with good results. In suitable cases extirpation of diseased tissue should be accomplished. (Kyle)

CHAPTER LVI.

SARCOMA OF THE FAUCES

THIS is a comparatively rare disease. It occurs more frequently in the tonsil than in the soft palate or post-pharyngeal wall, fully one-half of the cases reported having occurred in the tonsillar region.

Pathology.—Sarcoma differs little in physical characteristics wherever found. It has a greater tendency to localize itself than carcinoma, and when it develops in the tonsil it grows more rapidly than in the palate or post-pharynx. When located in the palate it extends somewhat slowly and, as a rule, in a backward direction. In the tonsil the spongy nature of the lymphatic tissues favors more rapid growth. Infiltration becomes extensive and the disease progresses toward the oro-pharynx and into the deeper tissues of the neck. Besides the greater rapidity of its development, in one other feature does sarcoma of the tonsil differ from sarcoma commencing in the faucial regions, and that is in its tendency to extend through the neck to the outside. There is no fixed rule of development, however, wherever the disease may be located. Chiari points out that frequently large tumors are formed in the pharynx, mouth, and upper jaw, and the malignant growth may even extend to the larynx, orbit, and cranial cavity, accompanied by deep and wide-spread ulceration.

Several varieties of this growth occur in the pharynx and soft palate, though perhaps the most frequent are what are called the round- and spindle-celled sarcomas. Cases of myxosarcoma, adenosarcoma, lymphosarcoma, fibrosarcoma, and giant-celled sarcoma are also reported.

It is the small, round-celled sarcoma which occurs most frequently in the tonsil. The cells are similar to those of the lymphatic glands, but their nuclei, while round, are larger. The spindle-celled sarcomas occur very rarely in the tonsil, and the large, round-celled rarely, if ever.

Etiology.—There is no definite cause known, up to the present, for the development of this disease, no method of ascertaining beforehand why it should arise in one person and not in another, no means

of analyzing the special conditions essential to its formation, and prophesying definitely the coming result. Certain premises, are, however, known. For instance, it occurs much more frequently in men than women. Unlike carcinoma it frequently affects childhood, while it is known to occur during all the ages of matured life. If there is any preference in this matter, sarcoma of the tonsil exhibits a greater tendency to develop during the two extremes: childhood and old age.

Symptomatology.—The development of sarcoma varies greatly according to the situation and virulence of the disease. In the palate it may come on insidiously, and give little indication of its presence, until deglutition and phonation is interfered with. There may be little cachexia and no glandular enlargement; but, when the growth is attached by pedicle, the mechanical presence of the dependent body may give rise to laryngeal symptoms.

In the tonsil the symptoms may come on more rapidly and be earlier felt. At first it might be taken for quinsy, but the latter is more rapid and accompanied by febrile action. As ulceration develops, hæmorrhage not infrequently occurs, accompanied by offensive discharges of pus and *débris*. In tonsillar sarcoma the deep extension may pass quickly through to the outer wall of the neck, where it becomes hard and nodular. Swelling of the neighboring glands occurs, and the cachexia of malignant disease is more readily noticeable.

Sarcoma of the pharyngeal walls, like sarcoma of the palate, seems to have less malignancy in detail than that of the tonsils. There may be less pain, less hæmorrhage, and slower development. The glands are less involved and the cachexia less marked. Still, the general symptoms are present in all, and each case, no matter where situated, is bound by no fast rules of clinical history.

Diagnosis.—The chief diseases from which sarcoma of the fauces has to be distinguished are adenoma, fibroma, and carcinoma. In the palate sarcoma has a light-reddish color and is rounded or nodulated in form. In the tonsil it may be of a darker red, while in the pharynx it may be of a still more purplish hue and mottled in outline. From carcinoma it is distinguished by the harder, almost-cartilaginous outlines, as well as lighter color, of the more malignant disease. The latter also spreads with greater facility, and is accompanied by more extensive glandular enlargement. Sarcoma extends backward and outward in its growth, while carcinoma usually has a forward development.

Fibroma of the pharynx is a very rare disease, slower in develop-

ment, and unattended by glandular sympathy. Adenoma, too, is slower in formation and less likely to ulcerate.

The possibility of mistaking at first sight sarcoma of the tonsil for quinsy has already been referred to, but the fact that the latter is an acute inflammatory disease, with the attending symptoms so easy to recognize, should at once remove all doubt.

The bacillus of sarcoma has so far not been discovered; but in each case, if possible, a microscopical examination of a minute section of the neoplasm should be made, to demonstrate the presence of the cells indicative of the disease.

Prognosis.—Although a very grave disease, it appears to be much more amenable to treatment, when situated in the palate or pharynx than when located in the tonsil. In any situation there is no tendency to spontaneous cure, but in the two former successful removal has been accomplished more frequently than in the latter, with a certain amount of immunity from future return. In the pharynx the growth is often pedunculated and removable. In the tonsil the attachment is broad and deep, owing to the mixed character of the tissue involved. The lymphatics of the tonsil have also intimate connection with the underlying lymphatics of the neck; this may possibly account for the greater malignancy when situated in this region.

In the palate enucleation from the surrounding tissues has in a number of instances been attended with the best results. The duration of the disease may be between six months and two or three years.

Treatment.—This may be divided into palliative and operative. Of the former, cleansing washes of an unirritating and aseptic character may be required to keep the parts free from purulent secretions. This with supporting measures is all that can be done. Of internal remedies, the administration of arsenic seems to be held in the highest favor.

Of operative treatment, there is no fixed rule for the guidance of the surgeon, except the necessity for the removal of the entire neoplasm when at all possible. If the growth is pedunculated, ablation by the snare is the best method at our command. This may be either by the cold wire or the galvanocautery-écraseur, and particularly applicable when the disease occupies the pharyngeal wall. When sessile or nucleated, excision may be necessary. It is always better to operate directly through the mouth when possible. At other times, when the external wall is affected, the tonsil being deeply involved, lateral pharyngotomy may require to be resorted to. The main thing in all

cases is to make the diagnosis positive as early as possible; and then, if there is any probability of a good result, to operate as thoroughly as possible and without delay. As to the method required, or the instruments to be used, each case must be carefully considered upon its own merits. The operator should be guided by the best judgment, either singly or in consultation, always remembering the possibility of severe hæmorrhage, which operations in this locality are liable to produce.

LEUKOPLAKIA PALATI.

This is a condition which sometimes, though rarely, affects the anterior border of the soft palate. Although not carcinomatous, it is said to bear an intimate relation to cancerous disease; and, if not removed, desquamation may set in, with the final result of the development of malignancy. As its name implies, it is distinguished by the development of little, white *plaques*, ranging from one or two millimetres to a centimetre in diameter, due to fatty degeneration of the surface-epithelium.

Treatment should be local applications of nitrate of silver, chromic acid, or electrocautery, together with the use of mild antiseptic sprays. Systemic treatment should be of a supporting character.

CHAPTER LVII.

CARCINOMA OF THE FAUCES.

SIR MORELL MACKENZIE defined carcinoma in this region as "primary malignant disease of the pharynx, generally causing death by starvation, but sometimes by hæmorrhage" (Fig. 94). At the present time, while this definition might be considered largely correct, a good deal of weight would be placed upon the influence of the toxins, evolved from cancerous growth, in hastening the fatal result.

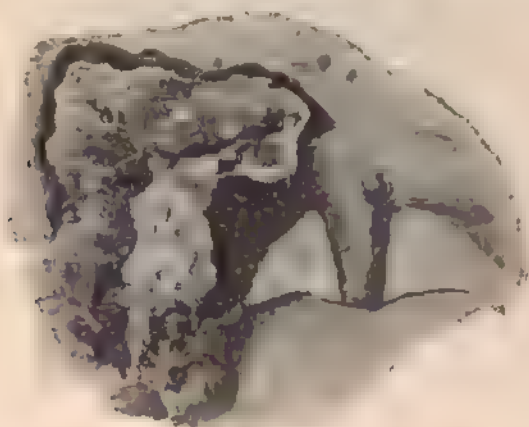


Fig. 94.—Malignant epithelioma, extending from right tonsil to base of tongue. (After Lennox Browne.)

Pathology.—The prevailing type of cancer of the fauces, whether in the tonsils, soft palate, or pharyngeal walls, is epithelioma. When located in the soft palate, the history of the cases reported seems to indicate a tendency not to spread very widely beyond the muscles of that organ. Whatever extension does occur is usually toward the pillars and tongue, rather than the pharyngeal tissues as in sarcoma. It has been noticed, in reference to this disease, that when it commences in muscular structures it appears to avoid lymphatic tissues

in its extension, whereas when it has its origin in lymphatic bodies, as in the tonsil, it spreads indiscriminately to the surrounding tissues, no matter what their structure may be.

Opinions are divided as to the comparative frequency of sarcoma and carcinoma of the fauces. Perhaps the weight of opinion is with the latter. There is this difference, however, that, while sarcoma of the throat occurs frequently during early life, carcinoma prevails during the middle and later periods. During mature years the lymphatic structures of the throat undergo shrinkage and diminished activity, while the epithelial and connective-tissue elements retain

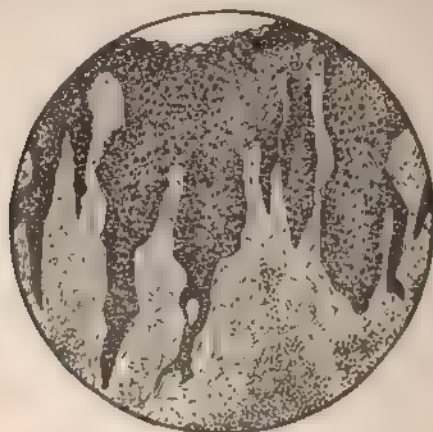


Fig. 85. Stratified epithelioma of tonsils ($\frac{1}{2}$ inch objective).
(After Lemmon Browne.)

their aptitude for increased development. If from any cause this epithelial proliferation becomes stimulated to an abnormal degree, we have a condition favorable to the formation of cancerous tissue, which, forming first superficially, penetrates deeper, displacing and invading normal tissue as the epithelial deposit increases.

In all parts of the fauces the development of cancer follows the ordinary course: rapid formation of the tumor, followed by peripheral ulceration and hæmorrhagic discharges. When located in the lower pharynx, the tendency of the disease is to spread downward, involving the œsophagus and larynx, when in the tonsil, outward and forward as well as toward the pillars, while, as said before, its first develop-

ment among the muscles of the soft palate is followed by a tendency to self-limitation.

Histologically epithelioma of the tonsils appears in two forms:

1. That of stratified epithelioma with fimbriated processes (Fig. 95).
2. That of cell-nest development along the track of the lymph-vessels (Fig. 95a).

Etiology. -The average age of persons afflicted with carcinoma of the pharynx is somewhat above fifty years. This in males and females is about alike; but one curious fact is noticeable relative to the cases so far recorded, and that is: while twice as many males have cancer of the palate and tonsils as females, the reverse holds

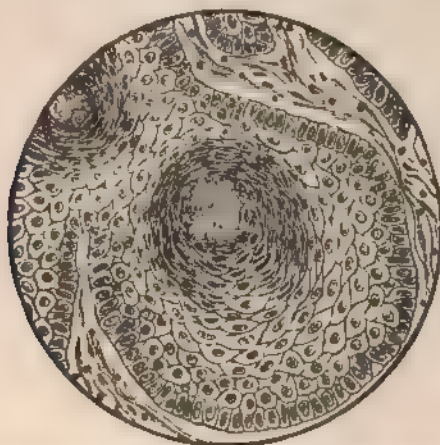


Fig. 95a —Epithelioma showing cell nests ($\frac{1}{4}$ inch objective)
(After Lennox Browne.)

good in reference to cancer of the lower pharynx; more than two-thirds of the cases reported have occurred in women.

Of the various regions of the throat, it occurs most frequently in the tonsils, the largest number occurring between the ages of forty and fifty years.

Hereditary tendency has something to do with its development, but how much, it is difficult to say. Exposure to vicissitudes of outdoor life is also said to be a cause, as also the excessive use of alcohol and tobacco.

Symptomatology. -When confined to the palate, and also when it has its origin in the pharyngeal wall, the early symptoms are chiefly

those of a mechanical character. There may be difficulty of swallowing and also muffled voice; but there is no fever, no hypersecretion of mucus, and but little pain. On the other hand, when the tonsils are the seat of the disease, sharp and lancinating pains are among the earliest symptoms. These are felt chiefly in deglutition, and as the disease advances increase in severity. They radiate in different directions from the part affected, but chiefly toward the ear. As the tumor develops either in the palate or the pharynx, the pains also become more severe, though they are probably never so excruciating as in tonsillar carcinoma. Ulceration is usually a comparatively early symptom, and in the tonsils as well as the pharynx is more likely to be followed by hæmorrhage than in the palatal disease.

Increased flow of saliva is also an early symptom, the salivary glands being stimulated to hypersecretion; hence drooling is often present.

The cervical glands become enlarged, particularly in tonsillar or pharyngeal disease, and the early development of cancerous cachexia is of frequent occurrence.

When the disease is situated in the lower pharynx, its extension to the œsophagus and larynx interfere decidedly with both deglutition and phonation, and also, as the disease becomes more severe, with normal breathing.

Diagnosis.—The diseases of the fauces from which carcinoma must be distinguished are chiefly those of sarcoma and fibroma. The latter is more rare in this region than carcinoma. It is slower in growth, is unattended by constitutional cachexia, is productive of less pain, and is usually pedunculated and consequently movable. On the first appearance of the neoplasm, however, before serious symptoms have had time to develop, there may in some cases be room for doubt; but these will soon vanish by a careful observance of the progress of the disease.

From sarcoma the distinguishing lines are less clearly drawn, except in typical cases; and it should be remembered that in many cases the indications of the two diseases so overlap each other that without microscopical examination it is almost impossible to arrive at a positive conclusion.

The typical sarcoma is a soft, red, fleshy tumor, not much given to ulceration and slow in forming, while typical carcinoma is harder even than fibroma, cartilaginous to the touch, and of a whitish-red color and nodulated. The cervical glands become involved early in

carcinoma, while in sarcoma they are late in becoming affected. In the same way the malignant cachexia is much more early in its manifestations in the former than the latter.

Carcinoma of the tonsil, which is usually scirrhus, is harder, whiter, and denser than sarcoma, much more painful, more given to deep ulceration, and more likely to extend, as it progresses toward a fatal result, into the oral region. Both are likely to be attended by hæmorrhage; but that from sarcoma is superficial, while the bleeding from carcinoma is more likely to be arterial.

Carcinoma of the walls of the pharynx differs from sarcoma, even more definitely than in the other regions of the throat. The former has the ordinary appearance of epithelioma, with broad, flattened, grayish, hard infiltration; the latter, dark red or purplish and pedunculated, as well as soft. Then when ulceration commences, which it does quite early in the disease, the appearance is almost diagnostic. The centre of the gray, elevated mass is depressed and covered with yellowish-red serum.

From adenoma, angioma, etc., there should be little difficulty in the matter of diagnosis, as, besides the difference in clinical symptoms and appearances, these diseases are free from ulceration and the general cachexia indicative of the graver affection.

The use of the microscope should in any event render the diagnosis more certain. Kröulein, in a history of sixty-one cases, says that they were all flat-celled epitheliomata, and, of these, fifty-six occurred in men and only five in women. No bacillus of cancer has so far been discovered.

Prognosis.—This is always unfavorable in carcinomatous disease of the throat, whether situated in the palate, tonsils, or pharyngeal walls. It is, in fact, a uniformly-fatal disease. The length of time the patient may live will vary from a few months to one or two years. In a few cases if operated on early the neoplasm may be removed and temporary relief secured for the patient; but recurrence almost invariably takes place, and sooner or later the result will be fatal.

Treatment.—Palliative treatment is about all that is advisable in these cases: mild washes to the throat and the application of sprays of cocaine to relieve the pain of swallowing. The spray of menthol in albolene, 2 to 5 per cent, will also produce a grateful and soothing effect upon the pharynx and help to relieve the excruciating pain which sometimes attends the disease. This is particularly the case if the menthol-spray is applied directly after the cocaine solu-

tion. It seems to have the effect of prolonging the action of the latter, and at the same time of preventing the depressing effect which the cocaine sometimes produces. Supporting measures in the most palatable form are also required, for the days of the patient frequently depend upon the length of time during which he can partake of food sufficient to sustain life.

With regard to operative treatment, to be effectual at all it must be radical as well as early: and many cases, even if taken at the very commencement, would not be fit subjects for operation. The question of excision in any case is a serious one, and upon it the surgeon must use his wisest judgment. Still, cases are on record in which the cancerous growth has been entirely removed, the wound has healed, and for a prolonged period there has been no return. Mickulicz's case, a woman, aged 65, who had been suffering for sixteen months, was operated on successfully by an external lateral operation; two and a half years later there was no return. Dupage, following Mickulicz's method of lateral pharyngotomy, operated successfully upon three cases, which are all said to have been cured, although the intervals between the operations and the report are not given. In Ferrard's case, aged 74, the growth was removed from the palate by knife operation, and five years later there had been no return. These are exceptions to the general rule.

It may be laid down as a reasonable conclusion that in all cases where the cancerous cachexia has become developed, radical operations should not be undertaken. Cases may occur, however, in which, although a speedily fatal result is certain, the malignant mass may so obstruct respiration or deglutition that a removal of part of it may give temporary ease. Menzes, of Amsterdam, reports a case of this kind. A large cancerous mass was growing from the right pharyngeal wall, producing complete nasal stenosis. He removed it by Gottstein's curette, affording, for a time, complete relief to the patient. In cases of this kind operation would be both justifiable and laudable.

When, on the other hand, cachexia is not noticeable, the growth is accessible, and there is a fair prospect of eradicating the tumor in its entirety, it is usually advisable to operate. The method must be governed by the circumstances of the case, together with the aptitude and experience of the operator.

If the intrapharyngeal operation can be accomplished successfully, either by snare, galvanocautery, or knife, it is to be preferred to the larger operation by external excision. Still, each case must

be judged on its own merits, the work being accomplished in accordance with the well-established rules of surgical procedure.

Kyle, our most recent authority, in his work just published dwells upon the differentiation which exists in this rare disease. He says: "If the carcinoma be of the epithelial variety, the growth is soft and spongy in character; or, if of the scirrhus variety, it begins as a hard irregularly-outlined mass. In either form, early in the growth the mucous-membrane surface is fairly normal in appearance; but with ulceration this is entirely lost. The cervical glands are involved, and in the scirrhus variety this involvement takes place early. If the growth occurs low down in the pharynx and is limited to the posterior surface it is more often of the fungoid character. It is very irregular in outline, and the surrounding structures are swollen almost to the point of being œdematous. In low involvement of the pharynx there is not such marked implication of the cervical glands."

CHAPTER LVIII.

NEUROSES OF THE FAUCES.

DISORDERED sensibility of the terminal filaments of the nerves of the pharynx are not of infrequent occurrence. They may be divided into neurosis of sensation and neurosis of motion.

NEUROSES OF SENSATION.

Neurosis of sensation may be present in the form of anæsthesia, hyperæsthesia, or paræsthesia, and occasionally as neuralgia. The first is of little moment, without it is associated with paralysis, of which it may be a symptom. When occurring alone it rarely calls for treatment. Possibly the administration of strychnine and the application of galvanism may be of benefit.

Hyperæsthesia and paræsthesia of the pharynx are practically synonymous terms, and indicate oversensitiveness of the mucous membrane, though the former is usually applied to touch, and the latter to the feeling of pricking and irritation which sometimes exists without apparently adequate cause. This is particularly liable to occur in hysterical women. As a rule, the palate is more sensitive than any other part of the throat. I have one male patient, however, aged 35, who has for years been under treatment, off and on, for atrophic rhinitis; but in his case the sensitive part is the base of the tongue. He cannot bear the slightest pressure upon it, without producing retching, although any other part of the throat can be touched with impunity. Even the application of cocaine is without controlling effect; the consequence is that in his case the use of a tongue-depressor is always out of the question. In the majority of instances pharyngeal hyperæsthesia owes its origin to some local lesion the removal of which would relieve the annoying symptoms.

Neuralgia of the pharynx is usually unilateral and may owe its origin either to a local morbid condition or to some form of anæmia. It is not, as a rule, associated with hysteria. Removal of any existing local lesion or tonsillar concretion, together with the administration of systemic tonics, such as quinine, iron, arsenic, or strychnine, would seem to be the best treatment.

NEUROSES OF MOTION.

Spasm of the pharynx is not of infrequent occurrence. It may arise from elongation or œdema of the uvula, acute pharyngitis, application of local irritants, etc. Courmont and Magnan relate cases arising from tabes, which were at once cured by suspension. They believe that the pharyngeal spasms are influenced by central or peripheral lesions. Spasm of the pharynx is produced by hydrophobia and also by tetanus, being in each case a symptom of systemic disease. The part usually affected is the soft palate, the levator palati being the muscle ordinarily involved in cases of chorea affected by pharyngeal spasm. In some cases the constrictor muscles are all equally involved.

PARALYSIS OF THE FAUCES.

One of the most common forms of throat paralysis is that in which it occurs as a sequel to diphtheria. It has been known also to follow acute lacunar tonsillitis. In these cases there is little doubt that the disease is of central origin, arising from the effects of the toxins of diphtheria upon the nerve-centres. In this affection the voice assumes a quacking or nasal twang. It becomes impossible in some cases to render tense the levator palati muscles so as to close the naso-pharynx from the oro-pharynx. Consequently, in attempting to swallow, the food will frequently pass into the vault above. In other instances, the pharyngeal constrictors having lost their power of contraction, ordinary deglutition becomes impossible, and the patient is obliged to force the food downward out of the oro-pharynx by filling his mouth with fluid and then aiding the process by the compression of the oral muscles.

In these cases, similar treatment to that prescribed for anæsthesia of the pharynx, the use of nerve-tonics, and the application of electricity may be tried; but they are often unavailing. Weeks pass away without apparent improvement; then the recuperative power of Nature slowly asserts itself, and the normal function is gradually restored.

Sometimes paralysis of the palate accompanies facial paralysis. It is then unilateral. No special treatment is required.

Myopathic paralysis occurs in some morbid conditions of the muscular fibres. Whether this is really the seat of the lesion, or whether the paralysis of certain muscles arises from an abnormal

condition of the smaller nerves or nerve-filaments, is still a matter of question. Sometimes one group of muscles may be affected, sometimes another; the affection may be either unilateral or bilateral.

Palato-glosso-pharyngeal paralysis is one of the symptoms of progressive bulbar paralysis. It arises from an anæmic condition of the medulla. It is rarely met with before the age of forty years. All the nerves supplying the muscles of deglutition and articulation may be involved. The glosso-pharyngeal, hypoglossal, facial, spinal accessory, and trigeminus, all having their origin in the medulla, may be affected in this disease. As a rule, the malady affects the tongue first, then the lips, palate, and pharynx.

As its name implies, it is progressive, slowly but steadily advancing toward a fatal issue. Early in the disease there is indistinctness of speech: dysphagia also is an early symptom. These steadily advance until articulation becomes unintelligible and deglutition impossible. Wasting and misery become extreme and the patient succumbs.

Acute bulbar paralysis may also occur. It is exceedingly rare, and differs little from the preceding, except in the rapidity of the progress of the symptoms and the speedy termination of life.

In treatment of either little can be done; and that little is confined to the relief of concurrent symptoms, based on the general principles of therapeutics.

CHAPTER LIX.

FOREIGN BODIES IN THE FAUCES.

TONSILLITHS.

IN connection with this subject a word might be said about the concretions or calcareous deposits which are sometimes formed within the lacunæ, or crypts, of the tonsils. In certain inflammatory conditions, which during middle age tend to produce connective-tissue hyperplasia, the mouths of the crypts may become closed, and the retained secretion inspissated, until in time calculus is formed. It is doubtful, however, whether this can occur without the previous deposit within the crypt of some small foreign body, which, as in the case of the rhinolith, becomes the nucleus around which the concretion gradually forms. These calculi were at one time considered to arise from a gouty affection of the pharynx. This theory has latterly been discarded, as repeated examinations of the tonsillar calculi have always proved them to consist of phosphate and carbonate of lime instead of urates. The symptoms are similar to those of commencing quinsy. Sometimes the diagnosis is a little difficult, owing to the completeness with which the foreign body is covered. Palpation and probe examination should remove all doubt. Still, instances have occurred in which the concretion was not suspected, until it was grasped by the tonsillotome. Treatment consists in removing the calculus by means of the forceps, or, when necessary, incision with bistoury in order to make extraction possible, and then removal with forceps or spoon. The use of a cleansing wash would be all the after-treatment required.

In the issue for January 7, 1899, of the *British Medical Journal*, Aitchison Robertson gives the history of the largest tonsillar calculus on record. It was shaped somewhat like an egg. Its greatest length was 4.4 centimetres and greatest breadth 3.8 centimetres. The weight was 26.8 grammes. The age of the patient was 50 years, and its presence was never discovered until it was expelled by violent coughing during a suffocative attack which occurred about the middle of

the night. It came from the right tonsil. There was no hæmorrhage, but a large cavity marked the site of its formation. It was pale yellow in color, had a worm-eaten appearance, and while fresh had a strong odor (Fig. 96).

FOREIGN BODIES

Foreign bodies are often lodged in the pharynx from without. They are very diverse in character, consisting of such substances as pieces of meat, fragments of bone, false teeth, buttons, coins, pins, needles, etc. Small, pointed bodies are apt to become fixed in the tonsils or pharyngeal walls or about the top of the larynx. Larger bodies, round or square in outline, are more likely to be lodged in the lower pharynx or in one of the pyriform sinuses or between the tongue and epiglottis. Occasionally the effect of Nature to expel the foreign body by spasmodic coughing results in throwing it forcibly into the naso-pharynx, where it may either remain lodged or be again expelled.



Fig. 96.—Robertson's calculus from right tonsil; weight, 26.8 grammes. Actual size.

The symptoms produced by foreign bodies in the pharynx are frequently distressing. Deglutition may be seriously interfered with or even suspended. Several years ago I removed a needle from the lower part of a woman's pharynx which had been lodged there transversely for twelve hours, during which time she had been entirely unable to swallow anything, not even fluids. There is no doubt in this case that the inability was partly voluntary, owing to the pain which the effort produced. Hard substances may lodge in the pyri-

form sinus, and produce pain in the lateral regions of the lower pharynx, as well as interfere with swallowing.

When the foreign body is located in the oro-pharynx, it may be observed in many cases by direct light; but, in the majority of instances, the use of reflected light and a throat-mirror will be required. In all doubtful cases the examination should be as thorough as possible, and, if the mirror fails to reveal anything, digital exploration may be resorted to, to make the diagnosis certain.

The history of the case, together with the symptoms and thorough inspection, will usually make the nature and position of the object clear. When still in doubt, the use of the sciagraph should remove all remaining uncertainty. It must be remembered, however, that not only may the presence of a foreign body in the pharynx be imaginary, but also that even the removal or expulsion of the foreign body may be followed for weeks or even months afterward with the impression in the mind of the patient that it is still in the old position. This is particularly likely to occur when the subjects are hysterical women.

Prognosis.—This varies according to the nature and position of the object. Sharp pieces of metal or bone may do serious harm. They have been known to penetrate the blood-vessels of the neck and produce death by hæmorrhage. In other instances they have frequently found their way into the tissues of the neck, and been extracted from situations far removed from the point of entry. Large bodies have become impacted, and have produced a fatal result, by ulcerating through the pharyngeal walls and inducing pyæmia.

In the majority of cases, however, they may be removed with more or less facility, and without leaving any serious effect upon the pharyngeal walls.

Treatment.—This consists simply in removing the foreign body as gently as possible, and with a minimum of injury to the surrounding tissues. To accomplish this, as a rule, we need a good reflected light, the throat-mirror, and forceps to suit the position and nature of the object. The finger, in exploration as well as removal, is often of great assistance. Some objects, such as pins, may be grasped between the finger and the nail, in not a few instances, and their removal effected. In some cases the curette will be of service, and in others the snare; while in still another class the careful insertion of the coin-catcher or the umbrella-bougie into the upper part of the œsophagus will result in lifting the object directly into the outer air.

After the removal no other treatment is required, except the warning to the patient that for some time the impression may remain that the foreign body is still within the pharynx.

When the obstruction seriously interferes with respiration, and cannot at the time be removed, tracheotomy may be called for, resort being made to further efforts after the artificial breathing has been established.

SECTION III.

Diseases of the Larynx.

CHAPTER LX.

ANATOMY OF THE LARYNX.

FOR the minute anatomy of the larynx the reader must be referred to the descriptions of more elaborate text-books. Enough, however, of the general anatomy may be given to indicate important points, without the knowledge of which it would be impossible to treat effectually diseases of this organ.

This complicated organ may be considered as an expansion of the trachea. It lies between the hyoid bone above and the trachea below. The lower pharynx and the entrance to the œsophagus lie behind it, and the skin and superficial tissues cover it in front. On each side are the great vessels and nerves and it is connected with the adjacent parts by muscles and ligaments.

Behind the larynx, from the tip of the epiglottis to the lower border of the cricoid, lie the third, fourth, fifth, and sometimes the sixth cervical vertebræ; that is, when the organ is in a stationary position. During phonation and deglutition, particularly the latter, it makes notable excursions in an upward direction.

The larynx is the entrance-door to the lungs, and allows the freest passage of air during the acts of inspiration and expiration. The other chief function of the larynx is that of phonation.

The larynx is composed of five principal cartilages: the thyroid, the cricoid, the epiglottis, and the two arytenoids. There are also four supplementary cartilages: the two of Santorini and the two of Wrisberg (Fig. 97).

The cricoid, or ring, cartilage is the foundation of the larynx. It rests directly upon the trachea. It is formed like a seal ring, the small, rounded, curved portion being in front, and the enlarged, thickened, seal division being behind. On the upper surface of the back part are two large facets for articulation with the arytenoids, and on the outer portions of the same surface two smaller depressions for articulation with the inferior cornua of the thyroid cartilage (Figs. 98 and 99).

The under surface is attached by fibrous tissue to the upper ring of the trachea.

The thyroid cartilage is shield-shaped, and forms the largest portion of the laryngeal frame-work. It is composed of two symmetrical,

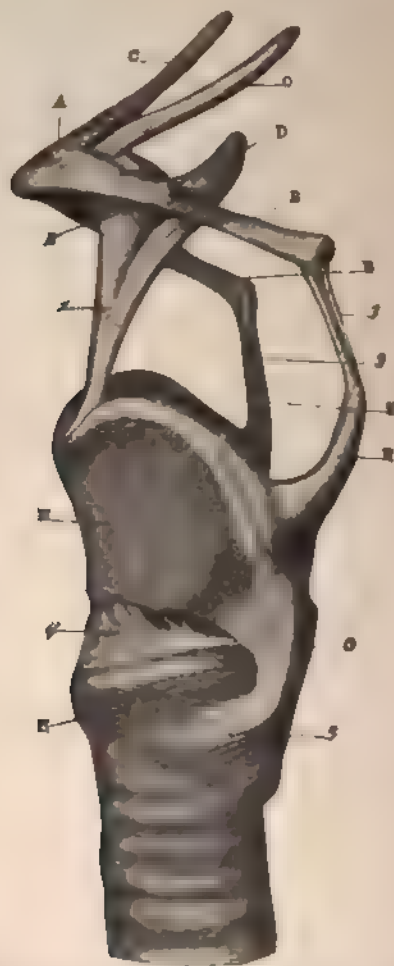


Fig. 97.—The cartilaginous frame of the larynx, with the hyoid bone and ligamentous attachments (Broca). *A*, Hyoid bone. *B, B*, The greater cornua of the hyoid. *C, C*, The lesser cornua of the hyoid. *D*, Epiglottis. *E*, Thyroid cartilage. *F, F*, The superior cornua of the thyroid. *G*, The lesser cornu of the thyroid. *H*, Cricoid cartilage. 1, Thyro-epiglottic ligament. 2, Hyo-epiglottic ligament. 3, Lateral thyrohyoid ligament. 4, Median cricothyroid ligament. 5, Lateral cricothyroid ligament. (After Bosworth.)

four-sided plates, united together in front, at an angle of about ninety degrees (Fig. 100). They form the front and lateral walls of the larynx, and, owing to their stability, are a direct protection to the delicate structures contained within the organ. The union of the two plates serves for the attachment of the cricothyroid membrane at the



Fig. 98.—The cricoid, seen anteriorly (Broca). 1, Anterior portion. 2, Posterior portion. 3, Internal surface. 4, Superior circumference. 5, Inferior border. (After Bosworth.)

lower margin. At the upper margin of union there is a deep acute angle, called the thyroid notch, into which is attached the petiolus of the epiglottis. Projecting perpendicularly from the posterior margin of each plate, one downward and the other upward, are two horns, or



Fig. 99.—The cricoid, upper surface. 1, 1, Articular facets for the arytenoid cartilages. (After Bosworth.)

cornua, the upper one on each side being attached to the hyoid bone, and the lower one on each side to the cricoid cartilage.

The arytenoids are little, cone-shaped, movable bodies, standing erect upon the lateral facets of the cricoid already described. Their internal faces are nearly parallel with each other. At their summits are attached the two little cartilages of Santorini. External to and

in front of the latter, and situated at the commencement of the ary-epiglottic fold are the little, stem-like cartilages of Wrisberg (Figs. 100*a* and 100*b*).

The epiglottis is a fibrocartilage and said to be shaped like a leaf.

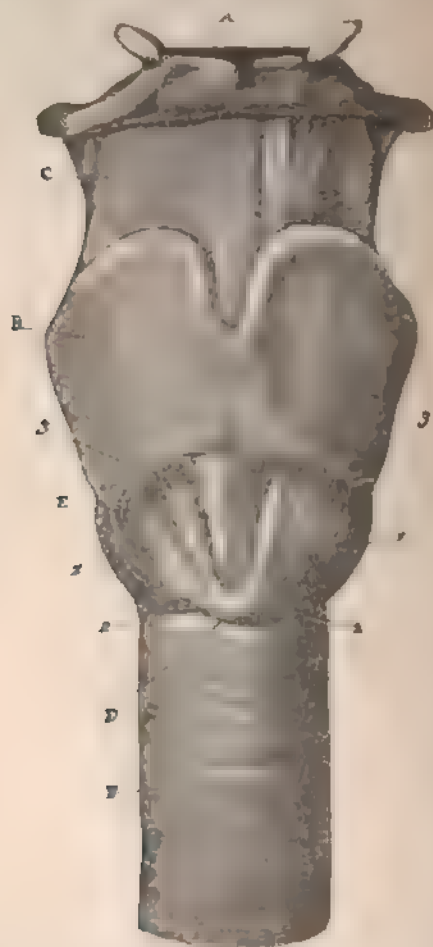


Fig. 100—The cricothyroid ponsle, viewed anteriorly (Broca). A, Hyoid bone B, Thyroid cartilage C, Thyrohyoid membrane D, Cricoid cartilage E, Cricothyroid membrane F, Trachea. 1, 1, Cricothyroid muscle 2, 2, Origin of the muscle from the anterior portion and side of the cricoid. 3, 3, Insertion into the lower border of the thyroid (After Bosworth.)

It varies more in form than any other organ of the body, not even excluding the nose. It stands immediately above the thyroid, with its open face backward, and is attached by its pedicle or petiolus to the superior notch of the thyroid.

As a rule, the epiglottis occupies more or less of a vertical position. The anterior surface is convex, or somewhat saddle-shaped from side to side, and concave from above downward. These outlines vary in different cases, and in extreme cases may even be the reverse of the ordinary rule. The posterior surface is slightly concave from side to



Fig 100a



Fig 100b

Fig 100a. The voice box, or larynx, seen from behind. 1, 2, Ring cartilage. 3, 4, Pyramid muscle. 5 and 6, Shield. 7 and 8, Tongue-bone. 9 and 12, Cartilages of Santorini. 10 and 13, Cartilages of Wrisberg. 11, 14, 15, Lid. 16, Windpipe. 17, Cushion of the lid. 18 and 19, Back ring-pyramid muscles. 20, 21 and 22, 23, Constrictors of the vestibule. (After Lennox Browne.)

Fig 100b. View of the voice-box, or larynx, cut open from behind. 1, 2, Ring cartilage. 3, 4, Pyramid muscle. 5 and 6, Vocal ligaments. 5, 6, 7, 8, Entrances to the pockets. 7 and 8, Pocket ligaments. 9, 10, Cartilages of Santorini. 11 and 12, Cartilages of Wrisberg. 11, 12 and 13, 14, Aryepiglottic folds. 15, Lid. 16, Windpipe. 17, Cushion of the lid. 18 and 19, Prop cartilages. (After Lennox Browne.)

side, and in some instances deeply concave, like the long diameter of the half-section of a flattened tube. Between these two every variety of formation may be found, the two sides in each case being, of course, symmetrical (Fig. 101).

The epiglottis is attached to the inner surface of the notch of the

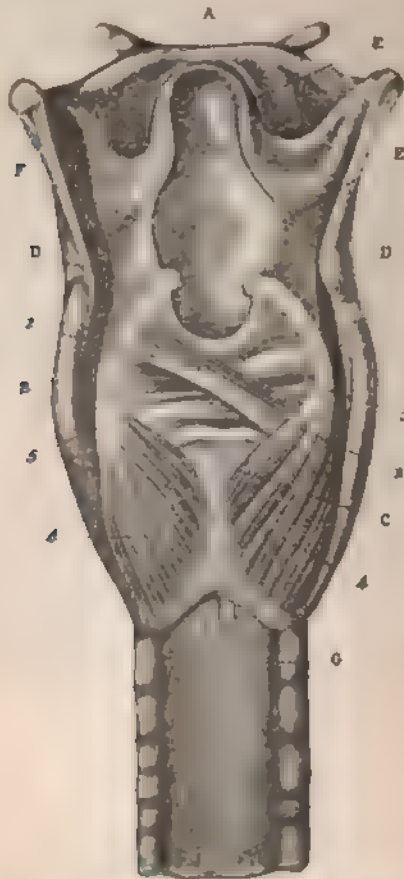


Fig. 101.—The arytenoid and posterior cricoarytenoid muscles (Broca). *A*, Hyoid bone. *B, B*, Posterior border of the thyroid. *C*, Posterior face of cricoid. *D, D*, Posterior border of the arytenoid. *E*, Epiglottis. *F, F*, Aryepiglottic folds. *G*, Trachea. *1*, Arytenoid muscle. *2, 3*, Oblique fibres of same. *4, 4*, Cricothyroid posterior muscles. *5, 5*, Their insertion in the outer angle of the base of the arytenoid cartilage. (After Bosworth.)

thyroid by a firm band of elastic tissue; when prominent, it is called the cushion of the epiglottis. The upper margin of this organ rises above the base of the tongue, to which it is attached in the front and the two sides by the glosso-epiglottic folds of mucous membrane.

In structure the thyroid, cricoid, and arytenoid cartilages are hyaline, and in old age have a tendency to calcify. The epiglottis and the cartilages of Santorini and Wrisberg are formed of fibrocartilage, and show no tendency to calcification.

The ligaments of the larynx are (1) extrinsic, (2) intrinsic, (3) mixed. There are three thyrohyoid ligaments: the median and the two lateral. The median one is a membrane of elastic tissue, attached to the posterior border of the hyoid bone above and the upper margin of the thyroid cartilage below. The two lateral thyrohyoid ligaments are cylindrical masses of fibro-elastic tissue, connecting the superior cornua of the thyroid cartilage with the greater cornua of the hyoid bone. Between these ligaments and the central membrane there is a thin layer of fibrous tissue. The cricotracheal ligament is a band of fibro-elastic tissue connecting the lower border of the cricoid to the upper ring of the trachea.

The intrinsic ligaments are the cricothyroid, the cricoarytenoid, the superior thyroarytenoid, and the inferior thyroarytenoid or vocal cords.

The cricothyroid is a band of elastic membrane connecting the two cartilages at the cricothyroid notch, and can be felt in front of the neck just below the prominence known as Adam's apple.

The cricoarytenoid ligaments are capsular, surrounding the cricoarytenoid joints on either side.

The superior thyroarytenoid ligaments form the ventricular bands, or false cords.

The inferior thyroarytenoid ligaments, or true vocal cords, are the most essential and important structures of the larynx. They are formed of strong bands of yellow, elastic tissue. They extend from the inner surface of the thyroid angle directly backward to the processus vocalis, or the projecting angles of the arytenoids. Each vocal cord is inserted as a single band at its anterior extremity. This splits up into three bands as it extends backward. The first is inserted into the vocal process of the arytenoid, the second is inserted into the anterior face of the same cartilage as high up as the ventricular band, and the third is inserted into the cricoarytenoid capsular ligament. A cross-section of the vocal cord shows that it is triangular, the apex, or

border-line, being turned toward its fellow of the opposite side (Fig. 102).

In the adult male the vocal cord has an average length of $2\frac{1}{2}$ centimetres and in the adult female $1\frac{3}{4}$ centimetres. The vocal cords are covered with mucous membrane, and the fibres of the thyroarytenoid muscle unite with their outer margins, making a large portion of their substance.

The only mixed ligament is the epiglottic, consisting of two portions, the outer and the inner. The outer connects the epiglottis with the root of the tongue and the hyoid bone. The inner, or thyroepi-



Fig 102—Side view of the larynx, showing the interior, the right plate of the thyroid being removed. 1, 2, Arytenoid cartilages. 3, 3, Processi vocales of the arytenoids. 4, Processus musculus of the right arytenoid. 5, Upper border of cricoid. 6, 6, Vocal cords. 7, Facet for articulation of the thyroid with the cricoid. 8, Left plate of the thyroid. 9, Left superior cornu of thyroid. 10, Cricoid cartilage. 11, Trachea. (After Lennox Browne.)

glottic, ligament connects the lower end of the epiglottis with the thyroid.

Between the cartilages and the mucous membrane there is a continuous layer of elastic tissue, giving resiliency as well as smoothness to the motions of the various parts.

The articulations of the larynx are the cricothyroid, cricoaryte-

noid, and the Santorini arytenoid. These joints are provided with articular cartilages, synovial membranes, and capsular ligaments, and the movements present are those of flexion and extension.

The larynx is supplied with three sets of muscles. 1. The cricothyroides in front, connecting the lower border of the thyroid with the cricoid. 2. The cricoarytenoides posteriores, or abductors of the vocal cords. 3. The cricoarytenoides laterales, or adductors of the cords, - the thyroarytenoides and the arytenoideus. Of the latter group the cricoarytenoides laterales and the arytenoideus are the adductors. The cricothyroides make tense and elongate the vocal cords, while the thyroarytenoides relax and shorten them. Besides these, there are a number of smaller muscles which help to adjust the glottis to the various positions required in the act of vocalization (Fig. 101).

Above and external to the true vocal cords and between them and the ventricular bands there is situated on each side an elliptical fossa, or fissure, extending nearly the whole length of the cords. These are called the ventricles of the larynx, or ventricles of Morgagni, after their discoverer. In the anterior end of each there is found a little pouch-like cavity, called the *sacculus laryngis*.

The arteries of the larynx are derived from branches of the superior and inferior thyroid arteries. These laryngeal branches are divided into two sets, the anterior and the posterior, the former consisting of branches from the thyroid only. The veins are similar in their arrangement to the arteries. They anastomose with the veins of the thyroid, the tongue, and the trachea, and they terminate in the internal jugular.

The lymphatics are supplied abundantly to the mucous membrane, arranged as a thick net-work. The lymphatic capillaries unite to form trunks on either side of the larynx: two above the ventricular bands and two below the cricoid. At the interarytenoid commissure the lymphatics are so abundant as to form a distinct thickening, called the laryngeal tonsil. Although the lymphatic supply to the mucous membrane of the larynx is so abundant, the cartilages, muscles, and ligaments are said to be entirely without lymphatic vessels.

The nervous supply is derived from the superior and inferior, or recurrent laryngeal nerves. The former is the sensory nerve of the larynx, derived from the pneumogastric, the latter is exclusively motor.

The mucous membrane of the larynx is supplied with both tea-sellated and ciliated epithelium. It is continuous with the pharynx above and the trachea below. The lower larynx up to the ventricular

bands, with the exception of the vocal cords, is covered with columnar ciliated epithelium. This extends upward over the interarytenoid commissure, and also over the lower half of the posterior surface of the epiglottis. All the rest of the laryngeal mucous membrane is supplied with tessellated or squamous epithelium.

The lining membrane is also richly supplied with muciparous glands, particularly the posterior surface of the epiglottis and the ary-epiglottic folds.

The inner larynx is sometimes divided into three sections: the upper, or tubular, from the epiglottis to the ventricular bands; the central, bounded by the ventricular bands above and the vocal cords below; and the inferior laryngeal, from the cords to the lower margin to the cricoid.

CHAPTER LXI

PHYSIOLOGY OF THE LARYNX.

THE larynx possesses two functions: one in respiration; the other in phonation.

The function of the larynx in respiration is to permit the free passage of air into the lungs during inspiration. The theory generally accepted has been that, during expiration, the air passing out through the glottis forces the vocal cords open without any muscular effort of the larynx being required, but that, during inspiration, the vocal cords act like a valve and would close but for the posterior cricoarytenoid muscles—the abductors, which open the gateway and permit the air to enter. The consequence is that the position of the cords in expiration is simply passive, while in inspiration it is active, being controlled by an impulse from the respiratory centre, the chink during the latter act being always the wider of the two.

Recent extensive investigations by Sir Felix Semon have thrown doubt upon the correctness of this theory. He claims that, in a large number of personal examinations of larynges during the act of breathing, he has found absolutely no change in the position of the cords during that act. He affirms that they simply occupy the position of complete muscular rest, the width of the chink of the larynx being precisely the same during inspiration as expiration.

My own examinations of larynges made since Semon so clearly expressed his views have vindicated his position, and I believe that the conclusion he arrived at is physiologically correct. The difficulty is that almost any one, while having his larynx examined, will unconsciously use undue effort during the act of inspiration. But let the observer wait until respiration has become passive, and he will find that the vocal cords remain motionless during both inspiration and expiration. The slightest inspiratory effort, however, will produce contraction of the abductor muscles, and, in my experience, the greater the effort, invariably, the wider will become the chink.

If this is the true condition, the valve-theory of the position of the vocal cords during inspiration must be erroneous, while the seem-

ingly more reasonable one, that the position of these bodies during inspiration as well as expiration is of a purely passive character, is probably correct (Fig. 103).

The proper performance of the function of the larynx during phonation depends on the extent and accuracy of the voluntary control of the vocal cords during expiration. These organs are drawn into the position of a narrow chink by the adductor and the tensor muscles, and then thrown into sonorous vibrations by forcing the air of expiration through them. It is thus seen that the function of respiration is really one of inspiration, while phonation is purely one of expiration (Fig. 104).

As said before, the only abductor muscles of the larynx, or those which expand the glottis, are the posterior cricoarytenoid



Fig. 103 The laryngoscopic image during respiration (After Bosworth)



Fig. 104 The laryngoscopic image during phonation (After Bosworth)

On the other hand, the muscles whose special duty it is to adduct the vocal cords, or close the glottis for purposes of phonation, are the lateral cricoarytenoid and the interarytenoid. The former pulls forward the outer angle of the base of the arytenoid cartilage, rotating inward the vocal process to which the vocal cord is attached, while the interarytenoid pulls into apposition the arytenoid cartilages. For finer adjustment of the cords, the thyroarytenoid, being attached as it is to the whole length of the outer border of the cord, by its bodily presence gives firmness as well as increased tension, the latter being aided by the action of the cricothyroid.

In the lower tones the larynx moves downward to a lower level in the throat, and in the higher tones to a higher level.

The attributes of the voice are pitch, intensity, and quality.

The pitch depends upon the number of vibrations of the vocal cords, during a given time, in producing the tone. The tighter the tension, the greater the number of vibrations and the higher the pitch.

The intensity depends upon the force of the expiratory effort.

The quality depends upon the combined influences of the whole vocal apparatus, including larynx, pharynx, nose, and accessory sinuses.

For a further account of the physiology of the larynx, particularly in regard to phonation and vocalization, the reader is again referred to more elaborate works upon the subject.

To perform these functions normally the vocal cords, as well as the muscles, must be in a healthy condition. Even slight congestion of the mucous membrane, particularly of the cords, may impair their vibration and produce weakness as well hoarseness of the voice. When the symptoms are more severe, the cause, of necessity, must be more serious, and, when neoplasms occur, respiration may be very seriously interfered with, and the voice in many instances destroyed.

CHAPTER LXII

LARYNGOSCOPY

THE principles of laryngoscopic examination are the same as those of examination of the post-pharynx. The uses of the head-mirror and reflected light are the same, while the difference in the throat-mirror is merely one of diameter, the circular face of the laryngeal mirror being much larger than the one required for post-rhinal examinations (Fig. 105). The reflected light should be placed in a dark corner, with as little as possible of the ordinary sunlight present.

In examining the larynx, after warming the mirror to a blood temperature in the manner and for the reasons already described, the patient is directed to take hold of the tongue with a napkin and draw



Fig. 105. Laryngeal and post rhinoscopic mirrors.

it gently out. The mirror is placed against the soft palate, pressing the uvula lightly in an upward and backward direction, and, other things being equal, the vision of the larynx is at once obtained (Fig. 106).

Although the directions are simple, it usually requires a little practice, as well as training of the patient to the use of the instrument to accomplish the end in view.

First with regard to holding the tongue. It is usually taught that the laryngologist should hold it himself with his left hand, while he holds the mirror lightly between the fingers of his right, but that in some cases the patient may be allowed to hold it himself. Personally, I believe the opposite should be the rule. Practically, I never hold the patient's tongue, but invariably direct the patient to do it. He can do it just as well as the operator, who then always has his other hand

at liberty; at the same time it increases the confidence of the patient, who feels that he himself is helping to do the work.

Sometimes, however, notwithstanding the training we give the patient, the ball of the tongue rises so high that it directly intervenes



Fig. 106.—The laryngeal mirror in position (Cohen) when held by the left hand (From Bosworth)

and prevents a proper vision of the larynx. In these cases, while the patient grasps the tongue, the examiner can hold it down with the depressor held in one hand, while he uses the throat-mirror with the other.

Not infrequently the palate is sensitive to pressure, and retching

occurs on attempting to use the mirror. Patient perseverance will usually overcome this. If not, a solution of cocaine or eucaine applied to the fauces will often allay the hypersensitiveness of the parts.

By instructing the patient to hold the head backward and to breathe quietly, the vocal cords will be seen midway between abduction and adduction. Below the glottis the rings of the trachea can be observed, and, in some instances, the whole length of the anterior wall of the wind pipe, down to the bifurcation of the bronchial tubes, is brought into view.

For the observer to see the vocal cords distinctly, and to bring them in line parallel with each other, the patient should slowly sound the word "ah." To obtain a still better view, the tone "ee," having a higher pitch, should be attempted. The epiglottis will then be more erect, as the larynx has attained by the effort a slightly higher position; but, in this instance, as the base of the tongue rises with it, the use of the tongue-depressor, as well as traction, may possibly be required.

The position of the epiglottis sometimes seriously interferes with a good view of the larynx. Instead of standing erect, it may lean permanently backward, obstructing the vision, or it may be curled upon itself so as to prevent direct light from being thrown upon the vocal cords. Even these difficulties may in most instances be overcome by the combined efforts of throwing the head back, using a very high tone of "ee," drawing out the tongue, and at the same time depressing it.

Instruments have been devised to draw forward the epiglottis in extreme cases, but they will very rarely be required.

In one extreme case¹ I found the epiglottis long and narrow, projecting horizontally backward and pressing against the post-pharynx, the patient breathing up through the narrow slits at the sides. To relieve the catarrhal and hoarse condition it produced, I removed a quarter of an inch from the end of the organ and so left a permanent clunk. Even then, however, the vocal cords could not be distinctly seen.

When the tonsils are very large vision may be obstructed; but the use of a small mirror may still render the larynx visible. An elongated uvula, while it may seriously interfere with the post-nasal examination, does not affect examination of the larynx.

On examining the larynx with the laryngeal mirror, the picture

¹ Transactions of the Pan American Medical Congress, Washington, 1893. Section of Laryngology.

will naturally be in a reversed position; that is, the tongue will be in a posterior portion of the mirror, and the posterior wall of the pharynx in the anterior. The right and left sides will also be reversed. Beginning, then, at the upper margin of the image, the first thing seen is the base of the tongue, and in front of it the notch which separates it from the epiglottis. This organ comes next, arched in most cases like a bow, with the concavity in front. On either side of it are the pharyngo-epiglottic folds. The color of the epiglottis is yellowish pink. Usually blood-vessels may be seen scattered over it. Beneath the concave surface of the organ, if the vocal cords are open, will be seen a triangular opening with its apex under the epiglottis and its base toward the front, of pink color, with whitish cross-bars. This is the internal surface of the trachea, already mentioned. Directly to the right and left, forming the arms of the triangle, are the broad, white vocal bands forming the glottis. When the vocal cords are closed the trachea will not be seen, but the two white cords will stretch from front to back parallel with each other. External to the true cords are two triangular surfaces of a much darker hue, their bases beneath the epiglottis and their apices stretching to the front almost the full length of the vocal cords. These are the ventricular bands. They occupy a higher plane than the vocal cords, being directly above and external to them. Between the two on each side lies the ventricle of Morgagni. Still farther to the right and left, and having their origin at the limits of the epiglottis, we have the right and left aryepiglottic folds, connecting the epiglottis with the arytenoid cartilages. As they approach the latter they converge and near their extremities are enlarged by two little, round, projecting bulges. The first is the cartilage of Wrisberg, the second the capitulum Santorini. Across the anterior side of the laryngeal mirror, connecting the two aryepiglottic folds, is the interarytenoid commissure, thus completing the circle of the internal larynx. Outside the aryepiglottic folds are two pyramidal cavities, called the pyriform sinuses, while still further in the front part of the image is the compressed opening to the oesophagus, lying slightly to the right side of the picture, meaning individually to the left. This is hidden mostly by the extensive folds of the post-pharyngeal wall.

Returning to the interior of the larynx, in certain positions, and in some larynges much more clearly than in others, directly below the epiglottis and above the angle of the vocal cords, we find the cushion of the epiglottis.

The mucous membrane of the larynx, as observed by aid of the laryngoscope, is of a light-pink color. There should be no accumulation of mucus anywhere, and in vocalization the vocal cords should come freely together, without any interference from a thickened mucosa between the arytenoids.

With regard to the position of the patient for laryngological examination, it is well for the operator to accustom himself to the use by the patient of any stool or chair which at the time happens to be convenient. Still, in his own office it is better to have an operating-chair specially suited for the treatment of the majority of his cases.

In laryngological work the patient should sit either perfectly upright or leaning forward in order to bring his head near to that of the operator, and in the line of perfect vision.

In order to accomplish this, I had my operating-chair made with a straight back and leaning slightly forward. The back itself reaches above the head of the tallest patient, and has down its centre a deep and wide groove, to fit the back of the head of any patient, young or old. This prevents any backward jerking when the head is rested against it. The concave surface likewise militates against any side-ward movement, while it enables the patient to slide the head upward or downward, and to adjust a view of the parts to the requirements of the operator.

CHAPTER LXIII.

AUTOSCOPY.

IN 1895, Alfred Kirstein, of Berlin, introduced to the medical profession a new method of examining the larynx and trachea which he styled "autoscopy." By this he meant direct linear inspection through the mouth of the lower pharynx, larynx, and trachea without the aid of a laryngeal mirror. In the following year, Max Thorner, of Cincinnati, gave an excellent translation into the English language



Fig. 107.—Position for autoscopy. This photograph was taken from a partly stripped patient in order to show distinctly the position of head and neck during examination. (After Kirstein Thorner.)

of Kirstein's monograph, with added improvements as the method became more complete.

The necessary conditions of a complete linear inspection are:—

1. "The body must be placed in such a position that an imaginary continuation of the laryngo-tracheal tube would fall within the opening of the mouth (Fig. 107).

2. "This imaginary straight line must be cleared of those parts of the body (epiglottis and the base of the tongue) which obstruct it."

The first condition, it is said, will be obtained by gently tilting the head backward so that the axis of vision, instead of being at an angle of ninety degrees to the axis of the trunk, will be at an angle of about one hundred and thirty-five degrees.

The second condition can only be obtained by drawing the base of the tongue forward and downward. To secure this position a special tongue-depressor is required, which must be slipped directly over the circumvallate papillæ to the root of the tongue. Pressure forward now upon that organ will remove it out of the way of vision, and at the same time, by compressing the median glosso-epiglottic ligament, elevate the epiglottis and so dispose of the remaining obstruction to the view. In some cases it may be necessary to slip the instrument over the epiglottis itself, and draw it forward, before the required view can be obtained; in these the use of cocaine will be required.



Fig. 108.—Autoscope with plate (P) instead of hood.
(After Kirstein-Thorner.)

Owing to the position which the examiner has to assume in practicing autoscropy, the ordinary stationary light required for laryngoscopy is useless, and he must either have an electric lamp fastened to his own forehead or, what Kirstein considers better, a species of electroscope attached to his special tongue-depressor. This transmits the light along the groove of the spatula, into the larynx of the patient, without its origin being seen by the operator (Fig. 108).

The autoscope consists of three parts: a spatula, a hood, and a handle.

The spatula for adults is 14 centimetres long; 2 centimetres wide at the tip, which is thickened and rounded to avoid injury to mucous membranes, and notched to receive the median glosso-epiglottidean ligament; and 1 $\frac{1}{2}$ centimetres wide where it passes over the convexity of the tongue; this portion should be grooved longitudinally, to

fit into the natural groove which the tongue exhibits on central depression. The tip of the spatula is bent downward, 1 centimetre lower than the ordinary grooved portion; so that it can press upon the base of the tongue, and by this means raise the epiglottis. The instrument is made of nickel-plate.

The hood, which is made of the same material, is, for the adult, 6 centimetres long and 3 centimetres wide. It fits upon the front end of the spatula, and serves to keep the passage clear for light and vision. It is inserted within the mouth, and is adjustable, preventing obstruc-



Fig. 109. Autoscopic operation. (After Kirstein-Thorner.)

tion from the upper teeth, upper lip, or mustache. The medium height of Kirstein's standard hood is about 6 millimetres, the slit being amply wide for examination purposes. When instruments require to be used the hood should be of greater height. The handle is set at right angles to the spatula, and to it is attached by special contrivance, the electroscope.

Kirstein says: "Autoscopy is a *difficult* act, until one has acquired a certain hard-to-define knack in introducing the spatula." The patient should bend the upper part of his body slightly forward, as in

Figs. 107 and 109, making the air-passage in a somewhat direct line. This gives the additional advantage of relaxing the muscles of the neck.

While autoscopia has the great advantage of direct vision, it is accompanied by several inconveniences. The chief ones are: 1. The expense of the required armamentarium, for operative instruments would require to be specially suited for autoscopic work. 2. The trouble of acquiring the technique. 3. The close proximity of the surgeon to the direct breath of the patient, with all that this involves.

Still, in the words of Kirstein: "For the purposes of scientific demonstration autoscopia is just the thing; a number of spectators can look, one after another, through the autoscope and note the condi-

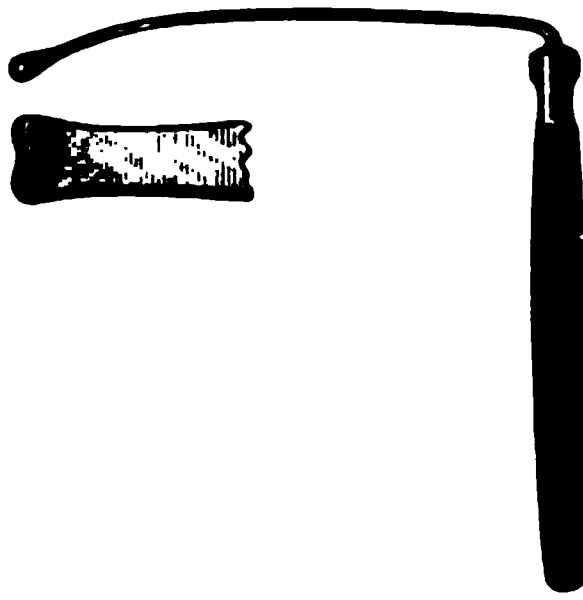


Fig. 110.—Tongue-depressor for pharyngoscopy and direct laryngotracheoscopy. Side-view and surface-view of the anterior portion. In some cases an instrument with a larger curve of the anterior portion is more practicable. (After Kirstein-Thorner.)

tions. In persons well adapted to autoscopia it is easy to demonstrate to any layman the movements of the vocal cord, the physiological pulsation of the wall of the trachea, the systolic beating of the bifurcation-spur, and quite as easily a carcinoma of the larynx."

In many cases the throat is so formed that even the skilled examiner can derive no advantage from the use of the autoscope; but the triumph of autoscopia lies in the incomparable view which it gives, in many others, of the posterior wall of the larynx and the entire inner surface of the trachea even to the entrance of the bronchi.

As autoscopia can be practiced with facility while the patient is under the influence of an anæsthetic, it is probable that it will be received with much favor for the examination of young children, with whom laryngoscopy is usually such a difficult matter.

The instruments for autoscopic operations are shaped like nasal instruments, with longer shafts. They should measure about 20 centimetres from the knee to the tip. Other things being equal, autoscopic operations should be easier than laryngoscopic ones (Fig. 109).

Since introducing this new method of examining the laryngeal cavity, Kirstein, for ordinary purposes, has somewhat simplified his technique. Many cases occur in which the hood is unnecessary, and in which the groove can likewise be dispensed with. If anything, the tip should have a longer curve, while the width remains the same as in the original depressor (Fig. 110). Instead of the electroscope attached to the spatula, the forehead-light of the operator would answer equally well.

With regard to the practical application of this method of operation, Max Thorner has reported a case in which he removed a piece of bone, four centimetres long, from the supraglottic portion of the larynx of a young man aged 24. The operation was done by the aid of the autoscope without the use of cocaine, the time required being only a few seconds.

CHAPTER LXIV.

INTUBATION.

THIS method of relieving laryngeal stenosis has long been a theory, crude instruments being used to obtain the object in view. They were not of much value, however, and it remained for O'Dwyer to introduce to the profession the method itself, with a full set of instruments capable of accomplishing intubation. His own record in

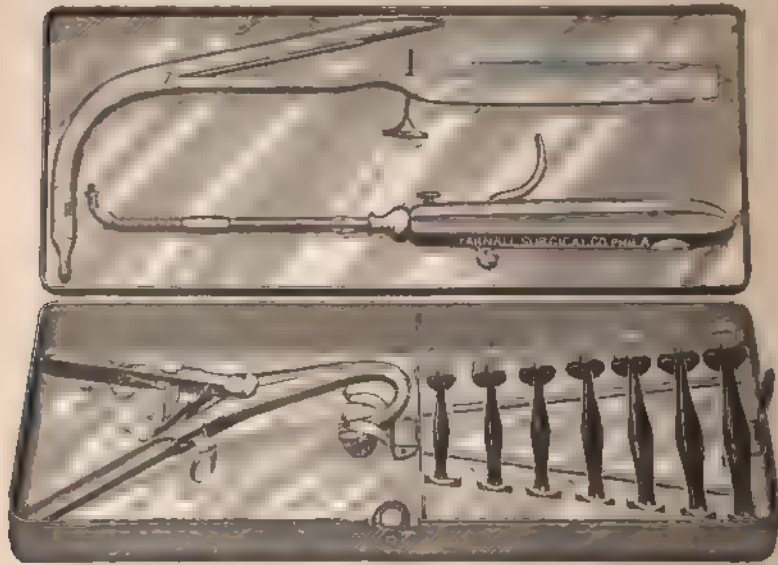


Fig. 111 O'Dwyer's intubation set

the use of these instruments has been brilliant indeed, the regrettable feature being that, at the moment when O'Dwyer's tubes had obtained a world wide reputation, and the advantages which his researches had given to science were being fully realized, he should be called from his labors and the glory which was the product of his genius. The saddest feature of all is that, notwithstanding this crowning effort for the good of humanity, he died a poor man

O'Dwyer's tubes consist of a series of instruments of different lengths and sizes, to suit the various ages of patients. Besides these, there is an introducer and an extractor that will fit all the tubes. Add to these a mouth-gag and a scale to regulate the size of the tube in accordance with the age of the patient, and the outfit is complete (Figs. 111 and 112).

The tube is a flattened cylinder bulging toward the centre. The head is rounded and flanging, to rest on the ventricular bands, and through one side of the head is a perforation for the insertion of a cord.

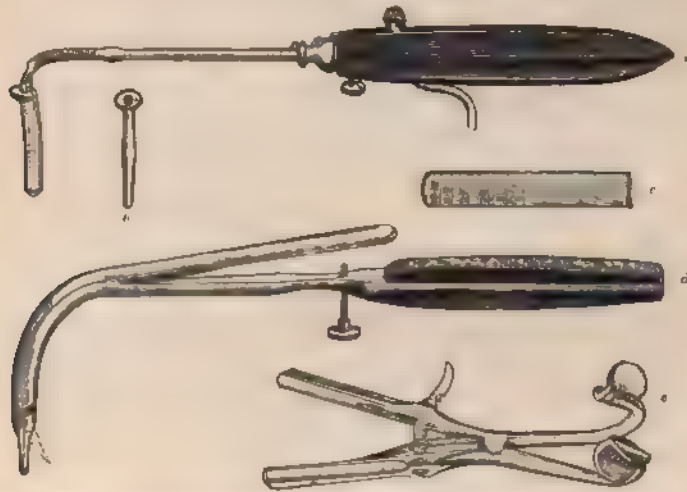


Fig 112 Instruments for intubation *a*) introducer; *b*) tube, *c*) scale; *d*) extractor; *e*) mouth gag

The introducer consists of a slender rod fitted with a handle. On it is a sliding tube. At the distal end of the introducer is the obturator, a thin, jointed piece of metal which is screwed on to the introducer at right angles. This passes through the tube.

The extractor is for the purpose of removing the tube when desired. It is shaped with a right angle somewhat like the introducer.

The mouth-gag is to keep the jaws apart during the operation.

To perform intubation during infancy or childhood, the patient should be wrapped in a sheet from the neck downward, so as to securely hold the arms and hands. He should then be held from behind in the upright position either in the lap of a nurse or standing on a

chair. The assisting surgeon should hold the gag, placed in the left side of the mouth of the patient, taking care to press the handles lightly against the cheek, to prevent the slipping of the instrument.

The operator stands immediately in front. The introducer is held in the right hand. The left forefinger, disinfected and oiled, is then passed into the pharynx, the epiglottis found, and, slipping the finger over it, the cavity between it and the arytenoids is detected. Immediately the end of the tube attached to the introducer, and armed with a strong thread, is passed along the palmar surface of the finger already touching the larynx, and, guided by it, is slipped over the epiglottis. The handle of the introducer is now raised so as to direct the tip of the instrument directly into the larynx. If this is not done, **the tube slips over the commissure into the œsophagus.**

The tube having entered the larynx, of which the operator may be sure by feeling the soft tissue all around the tube, the thumb is pressed on the button of the slide and the tube separated. In removing the introducer the left forefinger should be kept on top of the tube to secure its retention.

A finger-guard is recommended by some operators. It is a cumbersome contrivance, and in young children there is little enough space for the finger alone. I have never used one, and, although I have had the finger bitten once or twice, in each case it has been caused by defective holding of the mouth-gag: something which could always be avoided.

If failure of insertion occur on the first attempt, the child should be allowed to rest a few minutes before a second attempt is made.

When the tube becomes blocked by false membrane, during or immediately after its introduction, so as to produce threatened suffocation, it should at once be removed, and after a little while another trial made. In case of failure of effecting intubation, tracheotomy may in some cases be required in the attempt to save life.

In adults, and youths possessed of sufficient self-control, intubation may readily be accomplished without the use of the left forefinger, but by means of the laryngeal mirror.

The thread should not be removed until we are sure that the tube is not only in position, but also that there is no danger of its being occluded by membrane. Then it can be slipped out, care being taken not to remove the tube while doing so.

To remove the tube, the patient is again placed in the attitude required for its introduction. The extractor is carried down along the

left index finger as in the primary operation. The mouth of the tube is felt below the epiglottis and the closed tips of the extractor inserted into the open tube. By pressing the spring the blades are opened, and, grasping the inside walls of the tube tightly, the latter is at once withdrawn. The removal is often a more difficult operation than the introduction, and to render this part of the work easier, Max Thorner, of Cincinnati, brought before the profession, at the last meeting of the American Laryngological, Rhinological, and Otological Society, a design believed to be an improvement upon O'Dwyer's extractor and tube. The formation of the tube is the same, with the exception that the head is more widely and more deeply concave; so that when the extractor touches the cavity it will glide more readily into it. The extractor itself is likewise simpler in form, and serves the double purpose of introducer as well as extractor.

Sometimes the tube is coughed out and will require reinsertion.

One of the main difficulties in connection with intubation is the difficulty in deglutition which attends it, particularly in reference to fluids. Soft foods can usually be swallowed if given slowly and with care; but fluids are likely to get through the tube into the larynx and trachea. By adopting Cary's method of placing the patient on his back with the hips well elevated swallowing is said to be easier, and in some cases small quantities, even, of fluid can be given in this way. In any case fluid nourishment can always be administered by enemata, the chief part of it being readily absorbed.

Intubation is largely used in cases of laryngeal diphtheria occurring in children; and since the introduction of antitoxin into the treatment of this disease, the fatal issues, when the two are combined, have greatly diminished in numbers, while there is no doubt whatever, even when used alone, that it has saved many lives. The fact of intubation being accomplished without the use of the knife has caused it to be received with much favor by parents and friends of patients requiring operation, and for this reason it is frequently preferred to the seemingly more serious operation of tracheotomy. Casseberry relates the history of four cases also, occurring in adults, in which intubation resulted in the cure of this disease.

O'Dwyer has found intubation serviceable in a number of cases of stricture from tertiary syphilis in the adult. Other observers, too, following his example, have attained a measure of success in the same way. Deglutition in these cases is said to be comparatively easy, after the first day or two.

CHAPTER LXV.

TRACHEOTOMY; THYROTOMY

TRACHEOTOMY.

Up to the time of O'Dwyer's discovery of intubation this was the only operation known for the relief of suffocation arising from laryngeal stenosis. Since then intubation has in many instances taken its place. With the general public this has also been received with more favor, inasmuch as it is a bloodless operation. Still, there are many occasions in which tracheotomy stands alone in its utility and in which



Fig. 113. Plated tracheotomy tube

intubation would be worse than useless, while there are others in which the choice of operation must depend upon the surgeon's judgment of the case presented to him for relief. Further than this, numerous cases have occurred in which intubation, having been performed with unsuccessful results, tracheotomy as a *dernier ressort* has been required.

The diseases for which the operation may be required are oedema of the larynx, abscess of the larynx; syphilitic, tuberculous, or malignant laryngitis; the presence of neoplasms or foreign bodies, paralysis, pseudomembranous laryngitis, etc.

Instruments required are scalpel, retractors, tenaculum, grooved
(354)

director, thumb-forceps, etc., besides the necessary tracheotomy-tube suitable to the age of the patient (Figs 113, 114, 115, 115a). Also, to make the outfit complete, should be added needles, ligatures, tapes, scissors, and artery-clamps.

As a rule, an anæsthetic should be used, either general or local.



Fig 114 — Hard rubber tracheotomy-tube.

Until recently the former was always administered, either ether or chloroform. In childhood this is an important matter, as it is difficult to hold the child still enough to perform the operation when at all sensible to pain. In cases where the danger to life by delay is im-



Fig 115 — Elsborg's tracheotomy-tube.

minent or when, owing to carbonic asphyxiation, the sensibility to pain is materially diminished, the operation may be done at once, without attempting anæsthesia. In children of larger growth and in adults, hypodermic injection of a solution of cocaine in the region of the larynx

or upper trachea will answer as good a purpose as the administration of a general anæsthetic.

In the *Berliner klinische Wochenschrift* of June, 1898, Fraenkel speaks strongly in favor of local anæsthesia in these cases. He has performed tracheotomy twenty-three times during the last three years, the patients in every instance being under cocaine anæsthesia. Many of these operations would have been dangerous under a general anæsthetic. His plan is to inject hypodermically a few drops of a 20-per-cent. solution in two places near the site of operation, or of a 10-per-cent. solution in four places. In children he always uses the 10-per-cent. solution. In adults the amount injected is about 4 centigrammes of cocaine. He says that the patients dread the cocaine less than the chloroform. One of the advantages of operation under local anæsthesia is the removal of all necessity of undue haste. No

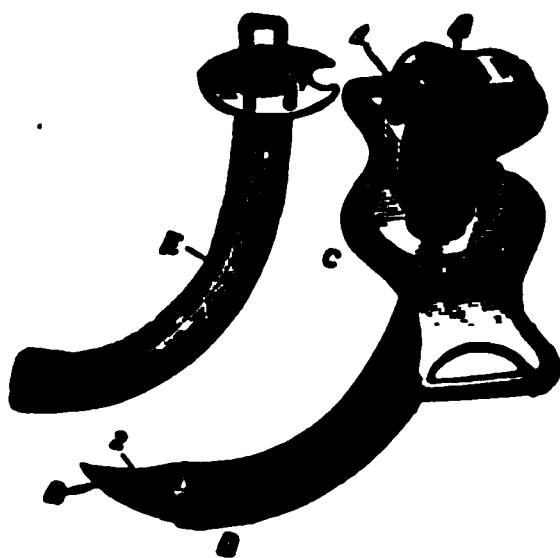


Fig. 115a.—Hank's tracheotomy-tube.

matter how anæsthesia is produced, it is always better to have one or more assistants, to aid in the various duties of the operation.

Tracheotomy may be either high or low. In high tracheotomy the incision into the trachea is above the isthmus of the thyroid; in low it is below the isthmus.

The former is the one usually performed, inasmuch as it involves fewer blood-vessels, and, being nearer the external surface, it is easier of accomplishment.

In preparation for the operation, the patient is placed upon the back with the head tilted backward by means of a roller or hard pillow placed beneath the neck, the object being to place the trachea and larynx in a prominent position. The neck is then thoroughly and quickly washed with a solution of corrosive sublimate, carbolic acid, or other disinfectant.

For the high operation the incision by the scalpel should be from four to six centimetres long, and directly in the median line, extending from the opposite cricothyroid membrane directly downward. The two ends of the incision should be beveled gradually in from the external surface at either end, making the longest part of the cut the external one. After the first or skin cut, together with that of the superficial fascia has been made, the dissection inward should be carefully done by means of the scalpel-handle, more than the blade.

The sternohyoid muscles are now brought into view. The areolar tissue is pushed aside by the handle of the scalpel, and the muscles are held apart on either side by retractors. These can be held by an assistant. The deep fascia is now in view, with the thyroid isthmus at the lower end of the cut. The parts are cleared of areolar tissue, exposing the two layers of fascia, one extending in front of the isthmus, the other behind it. The isthmus itself is a little pink body over the second and third rings of the trachea.

If on examination there seems to be room enough to insert the tube above the isthmus, the deep fascia is incised from the cricoid downward and drawn aside by retractors. If the space appears to be too small, a transverse cut is made through the deep fascia over the cricoid cartilage. It must be long enough to admit the scalpel-handle or grooved director, which is at once inserted and slid down between the deep fascia and the trachea, and tilted up so as to expose the two upper tracheal rings. In either case the tissues are drawn aside by retractors, the trachea seized by a tenaculum, and the first two or three rings cut in the medial line, care being taken not to incise the posterior wall of the trachea. The final cut into the trachea should not be made until the hæmorrhage from the previous incisions have abated or been controlled. Expulsive coughing usually follows after the trachea has been opened, relieving the passage of any secretions or false membrane that may be loose. In diphtheritic cases the surgeon should protect himself, as in intubation, from the contagion of particles of membrane expelled.

As soon as respiration is free through the artificial opening, as large a tube as will freely enter should be inserted. This should be watched for a few minutes, and when coughing is over, and breathing through it has become natural, the tapes, which had been previously attached to the rings, should be fastened round the neck to hold it in position. A thin piece of antiseptic absorbent cotton should be placed around the instrument between the shield and the skin of the patient.

The low operation is performed in a similar manner to the high one. The cutting is necessarily deeper, and consequently the incision should be longer, extending from the cricoid almost to the sternum. The muscles to be held aside by retractors are the sternothyroid, instead of the sternohyoid. There is more danger of hæmorrhage, as the plexus of veins over the trachea is larger and more copiously supplied with blood. Greater care is needed in dissection; and sometimes the thyroid artery, extending to the mesial line of the trachea, seriously interferes with the operation. When the neck of the patient is short and thick, the operation is much more difficult. This, however, is, in some cases, counterbalanced by the fact that the lower operation places a greater distance between the wound itself and the laryngeal disease than is possible in the high operation, and, other things being equal, would give the patient a greater chance for life (Fig. 116).

With reference to after-treatment, it is essential, in either case, that the tube should be carefully watched. Any obstruction that might occur in it should be at once removed, either by forceps or cotton-holder, or by taking out the inside tube, cleansing, and returning it. The mouth of the tracheotomy-tube should be covered with loose moist antiseptic gauze. This should be changed repeatedly and regularly. The air of the room should have a uniform temperature and humidity, being constantly charged with moisture in order to make the air of respiration as nearly the saturation point as possible.

The length of time the tube is worn will differ in each case, according to the circumstances relating to it and the nature of the disease for the relief of which it was inserted. The charge of the case should always be placed in the hands of a competent nurse, and directly under the surgeon's or physician's control.

THYROTOMY.

Fig. 117 represents the completed operation for thyrotomy, taken, together with Fig. 116, by permission, from Bosworth's recent work. The operation resembles somewhat that of tracheotomy. The incision is made through the integument along the mesial line, extending from above the thyroid notch to the cricoid ring. The integument being retracted, the areolar tissue is pressed aside by the handle of the scalpel, revealing the thyroid cartilage; and then with a strong sharp knife an incision is made in the mesial line from top to bottom. This incision should be gradually and carefully deepened by successive cuts



Fig. 116 Low unattached only After Bowman

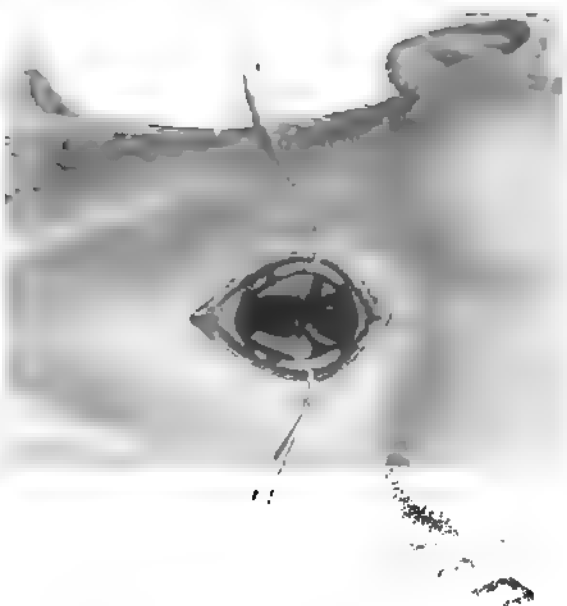


Fig. 117 Thyrotomy (After Bowman)

until the mucous membrane is reached. In later adult life the thyroid cartilage is frequently the seat of calcification and will require the use of the saw or cutting-forceps to separate it into segments.

It is important to sever the cartilage and also to control the hæmorrhage before penetrating the mucous membrane; otherwise a troublesome cough may render the completion of the operation more difficult.

In order to have the operation exactly in the centre, and at the same time to save the vocal cords from injury, it is well to incise the mucous membrane from below upward, the severed cartilages being held apart, while the position of the cords is exposed to view. By this means they become a guide to the completion of the operation.

It is always best, if possible, to leave a small portion of the cartilage directly beneath the notch unsevered. This will provide for more perfect union during the process of healing. In operating, the position of the cricothyroid artery crossing the cricothyroid membrane should likewise be remembered.

When the thyroid cartilage has thus been opened, it is often difficult to distinguish correctly the tissues within the larynx. Careful observation of the exposed arytenoids, however, in their to and fro movements, will sometimes remove the difficulty.

After removal of the growth, for which the preliminary thyrotomy has been performed, and hæmorrhage has been controlled, the cartilages are brought together again in as perfect apposition as possible and secured by sutures. In a child these should be of silk-worm gut and left *in situ*. The skin is then sutured in the ordinary way. (Bosworth.)

The question of preliminary tracheotomy and when it should be done must be decided in each case upon its own individual merits.

CHAPTER LXVI.

ACUTE LARYNGITIS.

THIS is a common, but not a dangerous, disease. It is unattended by sanguineous infiltration, the inflammatory process being confined to the mucous membrane without involving the deeper tissues. Its chief interest lies in the impairment or even loss of voice which usually attends its development.

Pathology.—The first changes are the abnormal dilatation of the laryngeal blood-vessels, with arrest of glandular secretion. This is quickly followed by exudation of serum and return of mucous secretion. The loose folds of mucous membrane become engorged with blood, as well as bathed in sero-mucous discharge. The parts most affected are where these folds are abundant as well as loosely attached, as in the arytenoid commissure and ventricular bands. As the vocal cords are not supplied with muciparous glands, their blood-vessels become dilated without discharge of mucus. The inflammatory action rarely extends below the vocal cords, and the epiglottis is likewise rarely a participant in the disease.

Etiology.—Without the existence of some predisposing cause, acute laryngitis does not often occur. This usually takes the form of obstructive interference with normal respiration, either from intranasal lesion or post-pharyngeal disease. What these pathological conditions are have already been dwelt upon. It will suffice to say that hypertrophic conditions of the upper breathing passages, when sufficient to produce oral respiration, may become a predisposing cause. The same may be said of chronic catarrh of the pharynx, and also of atrophic rhinitis, inasmuch as it deprives the air of respiration of its necessary moisture.

The immediate cause of the disease is frequently exposure to cold, getting the feet wet, sudden changes of temperature, too hasty cooling of the body during perspiration, etc.

It occurs at any age of life, but in men more than women, owing to the greater exposure incidental to their lives.

Inhalation of irritating vapors, such as chlorine, ammonia, etc., or excessive smoking may give rise to it. The internal administration of

iod. pot. in large doses will also in certain cases produce laryngeal inflammation.

Another cause quite common among voice-users is overstrain of the voice in singing, public speaking, etc.

Symptomatology. The most noticeable symptom is hoarseness in various degrees. It is rare, however, for complete aphonia to occur, for the simple reason that it requires more or less infiltration of the arytenoids or vocal cords to produce absolute loss of voice; and this would place it under the heading of laryngitis gravior instead of laryngitis mitior, or simple laryngitis. Without infiltration really exists, the voice can always be sounded by making extra effort, save in those cases where the nervous element has entered largely into the history, and in these the use of the laryngoscope should materially aid in the diagnosis.

Discomfort is usually in the form of soreness rather than pain, and partakes of the dry and slightly-burning character. There is no difficulty in respiration, but frequently a harsh, irritating throat-cough increases the general malaise. The cough, too, is out of proportion to the small amount of expectoration which is at first discharged from the inflamed throat. This secretion increases somewhat as the disease advances. There may be slight difficulty in swallowing solid food, while bland diet will slip down without effort.

Of fever there is but little. No distress of the general system and practically the disease resolves itself into temporary hoarseness accompanied by more or less irritation.

Diagnosis.—Frequently the abrupt onset of the disease, with the characteristic voice, is quite sufficient to establish the diagnosis. Still, there are many things which may produce hoarseness, and it is better when possible to make the opinion sure by the use of the laryngoscope. The chief aim in using it should be to examine the vocal cords. If they are smooth, although reddened, opening and closing evenly, and are without thickenings or indentations upon their borders, the diagnosis may be tolerably sure. The blood-vessels upon their surfaces may be higher colored and more prominent than usual, with the cords still white and glistening; or the whole surfaces of the cords in aggravated cases may be hyperæmic. At the same time, the mucous lining of the larynx will have a bright, congested hue, which in some cases may culminate in thickening of the interarytenoid commissure, preventing entire closure of the cords.

A red or pink color of the vocal cords, however, is not always a

diagnostic indication of laryngitis, nor either is a pearly-white condition a sure sign of a normal larynx.

This was brought out prominently by Heryng at the recent Medical Congress at Warsaw. He said that not infrequently the pearly whiteness was caused by layers of thickened epithelium, and that owners of vocal cords of this color would come to the laryngologist for treatment for vocal troubles, while, on the other hand, some of the best singers had red, catarrhal-looking cords. One of the finest lady-soloists he knew of had slightly red cords before singing, and very red ones after. In these cases all the symptoms and signs available must aid the laryngologist in arriving at a correct diagnosis.

In comparing hoarseness from this disease with that produced by other throat affections it should be remembered that the hoarseness of laryngeal tuberculosis is soft and weak, and that of syphilis is harsh and grating, while that from acute inflammation is even and firm, although it may be rasping in tone. In both the former, as well as in malignant disease, and when neoplasms are present, the hoarseness comes on gradually and slowly, without tendency to improvement, while the disease under consideration is self-limited in history.

Prognosis.—It is not dangerous to life, and it runs a course varying from a few days to a couple of weeks. The impairment of the function of voice-production, particularly in singers and public speakers, is the most important consideration in regard to it; another point is the probability of its recurrence, owing to the presence of the predisposing causes already named. Any tendency to extension of the disease down into the trachea or bronchial tubes must also owe its origin to the impaired naso-pharyngeal respiration rather than to laryngeal inflammation. These should all point to the importance of removing any stenosis that may occur in any part of the upper respiratory passages.

Treatment.—As this is a local disease, attended by so little febrile disturbance, I believe largely in relying upon local treatment. This should not, however, be confined to the larynx, but should commence with the nose and naso-pharynx. Whatever is the immediate cause of the disease, examination, as a rule, will find more or less nasal stenosis in one or both passages. In these, if treated at his office by the surgeon, a 1-per-cent solution of cocaine should be thrown up each nostril by an atomizer. A small quantity will suffice; and in two or three minutes the astringent effect of the cocaine will be noticeable. The patulous condition of the passages will be increased and the patient

can blow out freely any accumulations which hypertrophic engorgement may have allowed to gather. An important end now to be aimed at is to keep the passages open as long as possible, thus restoring normal respiration and facilitating laryngeal recovery. Speaking entirely from my own experience, I would again refer to the efficiency in prolonging the astringent affect of cocaine, which I have found the application of 1-per-cent solution of menthol in albolene to possess. When thrown into the nasal passages by an atomizer immediately after the absorption of the cocaine, it not only stimulates the secreting cells, thus relieving the engorgement, but also counteracts the depressing effect which the cocaine itself produces.

Next, the pharynx should be sprayed out freely with an alkaline solution, such as Dobell's. This will relieve both pharynx and larynx of any hypersecretion that may be present. If the larynx is found to be very much congested, a 1-per-cent. solution of cocaine should also be thrown into it through the down tip of the atomizer. The congested condition in a very few moments is somewhat relieved. The treatment immediately following this depends upon the length of time during which the disease has been in existence. If advice is sought near the onset of the symptoms a similar 1-per-cent. solution of menthol in albolene as that already applied to the nose will have a good effect, and a spray of:

℞	Thymol	2
	Menthol	6
	Albolene	60

M.

applied by the patient to the larynx every two or three hours until he again requires to see the physician, may be prescribed.

If the inflammatory condition is of longer standing and well established, the cocaine solution may be thrown into the larynx a little more freely, and followed immediately by the application of a 2-per-cent. solution of nitrate of silver by means of the laryngeal cotton-holder. A similar solution of the nitrate could be applied by atomizer, and Bosworth recommends it in this way. After the application of the silver the patient should carry out the home treatment as already described, returning every second day to have the application renewed.

In cases in which upon examination we find some hypertrophic

℞	Thymol	gr. ʒj.
	Menthol	gr. x.
	Albolene	3ij.

M.

nasal or pharyngeal tissue occupying a primary causative relation to the laryngitis, the question of advisability of operation arises. Some laryngologists believe in waiting until the laryngeal difficulty has subsided before operating. Others believe in operating as soon as the lesion is observed, believing that this itself will produce a cure. In my own mind, if there is little or no fever in consequence of the laryngitis, the latter is the plan that I prefer to follow; and I have never known it to be productive of evil results. Some nasal and pharyngeal operations are attended by more or less bleeding; and it is well to remember that this hæmorrhage may have a sedative effect upon the inflamed larynx. When, however, there is much febrile action or the laryngitis is severe, it is always better to postpone operative measures until abatement has taken place. In the same way galvanocautery operations within the nose should be postponed, on account of the œdema and stenosis which they sometimes temporarily produce.

When the inflammatory action is attended by much fever, and the laryngeal irritation is very great, a cure can be expedited by steam-inhalation frequently repeated, or by confining the patient to a warm room, surcharged with moisture evaporated from antiseptic solutions of one form or another. With this the administration of tincture of aconite, 1 drop per hour, is still a favorite remedy with many.

When confinement to the house becomes necessary, I prefer the application to the neck of equal parts of olive-oil and oil of turpentine, with an outside wrapping of absorbent cotton, to the old-fashioned method of poulticing. Cold packing to the neck is also productive of a sedative effect upon the inflamed larynx.

It is doubtful if benefit can be derived from the use of ordinary astringent lozenges in these cases. They do not come in contact with the interlaryngeal mucous membrane, and how a slightly astringent effect upon the pharynx can benefit the former is doubtful. When the chief ingredient of the lozenge is of a volatile nature the case is different. This may be said of menthol lozenges. They not only have a local influence upon the pharyngeal walls, but the vapor of the menthol is continually brought in contact with the mucous membrane of the larynx, producing a cooling, as well as astringent, effect.

One important point during treatment is to insist upon as little use of the voice as possible. The *primæ viæ* should also be regulated, and judicious efforts made to avoid any repetition of exposure to cold. The importance of absolute and continued nasal respiration should likewise be impressed upon the mind of the patient.

CHAPTER LXVII.

ACUTE LARYNGITIS OF CHILDREN.

IN early life acute laryngitis is more frequent than during adult years, owing to the generally loose attachment of the mucous membrane and to its increased vascularity. The inflammation, which is frequently pharyngeal in its origin, may extend merely to the upper portion of the larynx or may pass downward, affecting the infraglottic region. The loose attachment of the mucosa permits of a certain amount of infiltration without penetrating deeply into the submucous tissue, causing the croupous symptoms which so often occur in young children. The cases differ in severity, the milder ones being distinguished merely by a harsh cough, the more severe ones by a strident spasmodic closure of the glottis during the acts of coughing and breathing.

Pathology.—In this disease we have hyperæmia of the laryngeal mucosa, the minute vessels being gorged with blood and the loosely attached membrane being swollen to a more or less extent by lymphatic pressure. When confined to the supraglottic portion, the tumefaction is limited; when infraglottic it may be severe as well as extensive, almost closing the lumen of the cricoid region and producing severe laryngeal stenosis. The swelling of the parts is always confined to the mucous membrane itself, and does not involve the submucous tissue as in acute œdema, and is probably due to the presence of the lymphatic vessels, which in early years bears so important a part in the anatomy of the throat.

Etiology.—The presence of hypertrophy of the lymphatic tissues of the throat is frequently a predisposing cause, not only from the tendency to lymphatic inflammation incidental to early life, but also from the nasal stenosis which enlarged faucial or pharyngeal tonsils so frequently cause. The mouth-breathing which follows aids in producing laryngeal irritation.

The disease is probably more common among ill-nourished, neglected, ill-clothed children. Still, it frequently occurs in apparently strong and vigorous ones. Probably in these a careful examination would reveal a lymphatic tendency not at first noticed.

The exciting cause is usually cold or exposure to changeable and uneven temperatures. Children often get overheated while playing and will sit down, cooling the body unequally while the skin is still perspiring. The consequence is that the blood is driven from the surface to the internal organs, and the throat, liable as it is to catarrhal affections, is the organ most likely to be affected.

Boys suffer more frequently from this disease than girls, probably owing to greater exposure.

Symptomatology. The milder forms of acute laryngitis in children usually commence in acute rhinitis, the inflammatory action extending down to the pharynx and the supraglottic portion of the larynx. There will be dryness and irritation of the throat, with slight hoarseness and stridulous cough. The more severe cases, those to which the term spasmodic croup is so commonly applied, are more likely to arise in cases of tonsillar enlargement, the laryngeal symptoms arising from direct irritation. The constitutional disturbance is greater in the latter than in the former; and the fever, which is slight when the upper larynx is affected, is likely to become severe when the subglottic region is the seat of the disease. It is only in the latter that laryngeal stenosis is likely to be at all severe. Hoarseness will be of a shrill, metallic character at first, gradually assuming a harsher tone and in some instances ending in aphonia. Cough attends this disease from the first and is stridulous and croupy, with nocturnal exacerbations. The attack usually comes on in the night-time, and the child may cough for a quarter of an hour before it can obtain relief by the expectoration of a little mucus. Sometimes the exacerbations are repeated several times during the night.

The disease is more prevalent during the cold and damp months of the year, and, having once occurred in any child, is liable to recur again, unless the obstructive lesions, which may have given rise to the first attack, have been removed.

Diagnosis. — Laryngoscopical examination in young children is usually very difficult. Still, in some instances it can be accomplished, and will reveal the hyperæmic and infiltrated condition of the inner larynx. In these cases Kirstein's autoscope in skillful hands should do good service, and under chloroform should be particularly easy. According to Kirstein, it can be done without the use of the anæsthetic, but is necessarily difficult and somewhat dangerous, owing to the struggles of the child.

When visual examination of the larynx cannot be made by either

method, it makes the diagnosis more difficult, as the ordinary symptoms bear some resemblance to those of membranous croup or laryngeal diphtheria. Still, the severer disease is attended by much severer symptoms, such as higher temperature, more complete aphonia, more noiseless cough, and greater physical prostration. Most writers, at the present time, agree with the idea of the identity of pseudomembranous croup with laryngeal diphtheria; and it must be remembered, in the way of diagnosis, that in the latter the exudative disease is strictly progressive, while in the so-called spasmodic croup the nocturnal exacerbations are the most important feature.

Prognosis.—This disease is not usually dangerous to life. The nocturnal exacerbations are the only indications which should cause alarm. Usually they increase in severity for two or three nights. Then they abate and soon disappear, the harshness of tone and throat-irritation gradually passing away. The disease may be extended out to two or three weeks, but usually it is of shorter duration. Occasionally, though rarely, death may result from the subglottic edema.

Treatment.—As soon as the decided hoarseness or croupy cough occurs in a child, indicating the presence of acute laryngitis, he should be placed and kept continually in a temperature of about 70° F. It would be advisable to have moisture continually evaporated in the room. The bowels should be moved by a laxative, and mild soft nourishment should be given.

For internal administration minute doses of aconite, with carbonate or muriate of ammonia, do excellent service, as they relax the pores of the skin and stimulate the throat to mild secretion. The following are suitable preparations; either of these might answer for a child four or five years old:—

1.	R	Mur. ammon.	5
		Tr. aconite	25
		Glycerin	4
		Aquam.	ad 30
	M	Sig. One teaspoonful every one or two hours.	

1	R	Mur. ammon.	gr. viij
		Tr. aconite	gtt. iv
		Glycerin	5j.
		Aquam.	ad 3j.
	M		

1. R Carbon. ammon.	4
Tr. aconite	25
Glycerin	4
Aquam	ad 30

M. Sig.: One teaspoonful every one or two hours.

For external treatment I like nothing better than a stimulating emollient application to the neck of camphor liniment and olive-oil, equal parts, or oil of turpentine and olive-oil in like proportions. This should be applied with the warm hand to the neck, then a snug layer of absorbent cotton wrapped over it from ear to ear. By its warmth it promotes gentle perspiration, and thus depletes from the part, while it affords ease and comfort to the inflamed throat. The nocturnal attacks may be relieved by a hot steam-inhalation, and, when this fails, the inhalation of a few drops of chloroform will sometimes check the exacerbation.

As the child improves, the thickness of the throat dressing should be made gradually less, and care should be taken against too early an exposure to cold.

When in severe cases all other measures fail to give relief to the little patient, resort may be had to intubation. Prolonged use of the tube will not be required, as it is so frequently in cases of diphtheria, the insertion of the tube for a few hours, or a day or two in extreme cases, being all that would be needed. In so mild a disease, intubation is undoubtedly preferable to the more serious operation of tracheotomy.

After the recovery of the child, when the disease owes its primary origin to lymphatic hypertrophy, this should be treated according to rules already laid down, and by this means an end put to any tendency to recurrence.

1. R Carbon. ammon	gr. vj.
Tr. aconite	gtt. iv
Glycerin	℥j.
Aquam	ad 3j.

M

CHAPTER LXVIII.

ACUTE ŒDEMATOUS LARYNGITIS.

ACUTE inflammation of the larynx, attended by œdema, has long been described by writers under a diversity of names. The facts that it is an exceedingly acute inflammation, that the inflammation goes deeper than the mucous membrane, and that it is attended by sub-mucous infiltration are sufficient to make the above title, chosen out of the many it bears, one that at least is applicable to the disease.

Pathology.—The morbid changes are indicative of acute vascular turgescence, more rapid in formation than in simple acute laryngitis, and attended by extension to the submucous tissues, with almost immediate serous infiltration. This occurs most extensively where the mucous membrane is loosely attached, as in the region of the ventricular bands, the aryepiglottic folds, and the posterior surface of the epiglottis. The arytenoids are almost as readily swollen, while the vocal cords and the infraglottic region, with a more closely attached mucosa, are less liable to the disease.

As a rule, the affection is bilateral, and, if unchecked, staphylococci, streptococci, and other organisms make their appearance in the infiltration-fluid, and the disease may pass through from the serous stage into the purulent. These changes occur more rapidly when the disease is unilateral. The condition in any case is one of acute cellulitis.

Etiology.—Sudden and unequal exposure of the body to cold is the apparent cause of a majority of cases. It is generally believed, however, to owe its origin to micro-organisms; and that the unequal temperature to which the patient might be exposed, is only the match which kindles the fire, the fuel for which has already been prepared for ignition. What would seem to give color to this belief is the fact that, while exposure in one case may produce simple acute laryngitis, in another similar exposure may result in intense œdematous disease.

Recent observers, as Levi and Lameris, believe the œdema to be of infectious origin, while Lissas believes that it may be even a traumatic œdema, immediately dependent upon local vasomotor disturbance the result of cold

It occurs more frequently in males than females, and in early adult life than in later or earlier years. It is a rare disease, sympathetic œdema of the larynx being much more frequent in occurrence.

Voice-straining has been an apparent cause in some cases, and facial erysipelas has sometimes been followed immediately by œdema of the larynx, which, in all probability, was an extension, if not a metastasis, of the erysipelas itself.

Traumatic causes will produce acute œdema, as from inhalation of hot steam or swallowing of boiling water, etc. As a secondary affection, it may arise as a complication of the various exanthemata, though the cases are exceedingly rare.

Symptomatology.—The throat symptoms occur so quickly and are of such distressing character that the ordinary premonitory symptoms of chilliness and fever are sometimes overlooked, although they may be present in every case. In the most severe one that I have ever seen no premonitory symptoms of any kind were observed, save a slight feeling of weariness. Without warning, the patient, a strong young man of 25, was seized with dyspnoea, and in six hours it became so severe that respiration became stertorous and the face cyanotic.

The voice soon becomes lost in a soft hoarseness. Inspiration and expiration both become labored. At first the face is flushed, and, as difficulty in breathing increases, the purplish hue of cyanosis takes its place.

These symptoms may become fully developed in from ten to twenty-four hours, or, as in the case referred to, in a shorter period. In severe cases the result will be fatal in from one to three days, without surgical relief of one form or another is secured. In milder forms of œdematous laryngitis the course may result in spontaneous resolution or the development of abscess in some particular spot, with abatement of the general disease.

In the severer forms, if the patient does not succumb quickly to the progressive stenosis, abscess may become diffused, speedily bringing about a fatal issue.

Diagnosis.—Many things will produce laryngeal dyspnoea; and to distinguish acute œdematous laryngitis from all of these a careful laryngoscopic examination is absolutely necessary. Digital examination may be of some value, revealing the soft tumefaction of the epiglottis and aryepiglottic folds, but it must be remembered that, without the explorer is familiar with the touch of the laryngeal region, it cannot be of much service. On the other hand, in this progressive age

it should be the duty of every physician to familiarize himself with all the methods used in the exploration of the affected parts.

By the use of the laryngoscope the mucous membrane of the larynx will be seen greatly distended. The epiglottis will be thickened, particularly upon its border and posterior surface. The lateral folds of the inner larynx will be rolled out behind and to the sides of the epiglottis, the three forming a triangular chink in the glottic region.

Although the color is that of increased redness, there is a watery and transparent cast to the tumefaction, the extent of which depends upon the severity of the disease. When pus has commenced to form, the spot of its development will be marked by increased swelling or pointing, as well as the assumption of a lighter color.



Fig. 118. Bosworth's laryngeal knives.

Prognosis.—This is always exceedingly grave. In some cases, without surgical treatment, a rapidly fatal result may be expected, arising from serous stenosis, before the disease has existed long enough to give rise to the development of pus. Milder cases may undergo resolution without pus-formation, but usually they end in localized development of abscess, with discharge and recovery. The danger lies in suffocation; hence the cases should be watched with the greatest care.

Treatment.—Mere local applications of any kind may be considered as useless in promoting the main object of treatment: the reduction of swelling. This can be accomplished, however, by free scarification of the inflamed and infiltrated tissues with a curved laryngeal knife, such as Bosworth's or Tobold's, guided by the laryngeal mirror (Fig. 118). Free exudation of sero-sanguineous fluid follows. This can

be aided by hot steam-inhalations, which, while promoting discharge, have a grateful effect upon the inflamed tissues. The scarification may be repeated every few hours until the urgent symptoms abate. In the case already referred to, this plan of treatment was rewarded by a successful issue.

Pryor reports a case cured by external leeching, aided by hot foot-baths and hot lemonade. Levi also reports one cured by applying six leeches to the laryngeal region. Both were cyanotic; the stress was laid on the fact that scarification was in these cases unnecessary. Tiarus in 1897 cured a case by removing a piece of the infiltrated membrane by punch-forceps, thus promoting free secretion.

In cases where suffocation becomes imminent, any of these means cannot be relied on, and tracheotomy will require to be done. There is no doubt that this operation is preferable to intubation in this disease, as the laryngeal swelling is usually on a higher plane than the cap of the intubation-tube, when placed within the larynx. Consequently, if it were inserted, the œdema might continue to produce stenosis, notwithstanding the presence of the tube. When abscesses point, no matter where located, they should be promptly opened.

Supporting measures during treatment are required; and care should always be exercised against avoidable changes of temperature.

CHAPTER LXIX.

SIMPLE OEDEMA OF THE LARYNX.

SIMPLE oedema of the larynx, unconnected with any inflammatory condition of that organ, not infrequently occurs. It is rarely, however, of merely local origin, but is a result of severe systemic disease and is of a secondary nature. It occurs during all periods of life, but rarely in extreme age. The majority of cases occur in males.

Pathology.—In this disease there is simply effusion of serum into the loosely-attached submucous tissues of the larynx, the infiltrations being largest in the aryepiglottic folds and the posterior surface of the epiglottis. Still, all parts are liable to tumefaction, and in some cases the ventricular bands have been the only parts affected. The vocal cords and subglottic region are not often involved. Whenever obstruction to the blood-current is an element of the disease, the slight resistance which the larynx offers to infiltration renders it more liable than other regions to immediate dropsical effusion.

Etiology.—As it is a secondary disease, the cause must be looked for in general affections of the system which have a deteriorating influence upon the vital powers. Any systemic disease which may produce dropsy in other parts of the body, other things being equal, may give rise to it here. Bright's disease, tuberculosis, syphilis, and carcinoma are among its causes. Obstruction of venous circulation from the head, as by pressure from thoracic or aortic aneurism, may also be a cause.

Symptomatology.—The onset of the attack may be sudden, but usually it comes on gradually. Instead of hoarseness there is very soon complete aphonia. Dyspnoea is the prominent symptom. Inspiration becomes exceedingly difficult owing to the swollen aryepiglottic folds rolling in and closing the glottis. Expiration, on the other hand, is not so difficult, as the swollen bodies by the effort roll out again. Still, the cords are kept so wide apart by the tumefaction that vocalization often becomes impossible. Cyanosis soon occurs, with all the other symptoms of impending suffocation.

Diagnosis.—This is best made by the use of the laryngoscope

The existence of laryngeal stenosis is so self-evident from the symptoms that the only difficulty is to be sure of the variety of the laryngeal disease. The autoscope, too, particularly in young subjects, should serve an excellent purpose in giving direct vision of the infiltrated tissues. The resemblance to phlegmonous disease may in some cases be striking. Still, the swelling in oedema is likely to be more diffused and the color of the mucous membrane paler, while the presence of systemic disease as the direct cause should rule out the phlegmonous or acute oedematous laryngitis. The shining, grayish-white, translucent appearance of the swollen masses in the larynx should distinguish the oedema from any other lesion.

Prognosis. As an indication of serious organic disease, the presence of oedema of the larynx is of the greatest importance, and is usually the prelude to speedy dissolution; and, although the primary disease may be necessarily fatal, the laryngeal stenosis itself, if not relieved, may terminate the case in a few hours.

Treatment. If the oedema is severe, with threatened stenosis, the first effort should be to relieve the swelling by free scarification. The room should be warm and the atmosphere charged with moisture from an evaporating-kettle. When it arises from tuberculosis or malignant disease this treatment will often be of service for the time being, even when constitutional treatment can be of no avail. In syphilis the local scarification may relieve the breathing while mercurials and iodides are producing a systemic effect. When general anasarca exists from heart or kidney disease or cirrhosis of the liver, heart tones and drastic cathartics would seem to be indicated in addition to the surgical treatment of the larynx, though the relief at best could only be of a very temporary character.

In malignant disease tracheotomy may be required. Intubation, owing to the chief effusion being supraglottic, would in most if not all cases be practically useless.

CHAPTER LXX.

CHRONIC LARYNGITIS

THIS is a chronic inflammation of the mucous membrane of the larynx. It is usually supraglottic, but may extend through the vocal cords to the infraglottic region. It is always of a catarrhal character, and does not include affections of the larynx arising from tuberculosis, syphilis, or malignant disease.

Pathology.—There is thickening of the mucosa, with hyperæmia, the blood-vessels being permanently dilated; also cell-proliferation, with increased secretion. When the disease is of long standing there is increase of lymphoid tissue as well as of the surface epithelium and tubular glands. The whole of the lining membrane of the larynx may be affected, or the disease may be confined largely to the arytenoids, interarytenoid commissure, and the ventricular bands. Sometimes the vocal cords are involved in the inflammatory action. Finally, the condition may extend downward, producing cell-proliferation and discharge from the infraglottic region and the trachea itself. In simple chronic laryngitis erosions are rarely present. When they do occur, they arise from the breaking of the epithelial coating from the pressure of the thickened connective tissue beneath, and can only be found in cases of long standing.

Etiology.—The usual cause is some diseased condition of the nose or naso-pharynx producing nasal stenosis. Anything that will produce chronic naso-pharyngeal catarrh has a tendency to induce a similar condition in the larynx. Whether this arises from direct continuity of the diseased mucous membrane, or from irritation caused by the presence of catarrhal secretion in the region of the epiglottis and arytenoids, opinions are divided; but where the condition exists, in many instances, chronic laryngitis is the result. In other individuals, nasal stenosis, accompanied by catarrhal pharyngitis, will directly induce chronic laryngitis by enforcing the inspiration of unwarmed, unfiltered, unsaturated air, the constant breathing of which will have an irritating effect upon the laryngeal mucous membrane.

Atrophic rhinitis is also a frequent cause, particularly in cases

where it has already produced pharyngitis sicca. In these instances the turbinates have already lost the function of transudation, and the air passes over them to the larynx unmoistened and loaded with putrescent emanations. Crusts and foul catarrhal *débris* often impede the entrance to the laryngeal cavity, and everything directly favors the development of a chronic catarrhal condition.

In many instances, particularly in voice users, the naso-pharyngeal condition is not sufficient *per se* to induce the disease, but merely acts as a predisposing cause; and any excessive strain, either in singing or speaking, particularly when frequently repeated, will result in the development of the disease.

Many speakers who breathe correctly when in a passive condition entirely ignore correct respiration while speaking. What is called the "recovery" in inspiration is made by them through the mouth, and not through the nose. This is a fault which, if properly attended to, could, as a rule, be avoided, and, if the nasal recovery was insisted upon by the speaker, it would not only insure the saturation of the respiratory air, but would also make the utterances more leisurely, and by this means save the voice. For singers to inspire naturally while carrying on their vocation is much more difficult. It is well to remember, however, that there is some compensation for the loss of turbinal secretion in these cases in the profuse salivation which voice-using produces.

Elongated uvula and hypertrophic tonsils may also, by the pharyngeal irritation they produce, lead to chronic laryngeal disease.

Males are more subject to chronic laryngitis than females, owing to the more frequent exposure, and, in public speakers, to more excessive use of the voice.

The disease occurs most frequently during early adult and middle life.

Symptomatology. Slight irritation of the larynx, with tendency to repeated hawking, are among the earliest symptoms. Sometimes there is a sense of dryness, accompanied by spasmodic efforts to clear the throat. These symptoms are, however, of a minor character, and are marked, in a measure, by the gradual development of hoarseness. This may not be noticed much during ordinary conversation, but in singing or public speaking becomes annoying both to speaker and hearer. Any extra exertion of the voice in either of these ways may produce burning and tickling sensations in the larynx, with the effect of producing a dry, spasmodic cough.

The use of the voice by persons affected by chronic laryngitis is

followed by different results in different persons. In some huskiness will develop into hoarseness, and, if the voice continues to be used, into complete aphonia, while, in others, even hoarseness will gradually disappear as the speaking or singing continues, and the voice become clear before the end is reached. In the first the laryngeal glandular secretion becomes exhausted, while in the second the secretory follicles have retained their power, and, being stimulated to extra secretion by the action of the laryngeal muscles, have lubricated the vocal cords and enabled them to perform their increased duty.

The discharges from the larynx are usually of a grayish color and scanty, without the inflammatory action extends to the infraglottic region. Then they become more copious and of a yellowish color, the voice becoming more easily fatigued.

Diagnosis.—The oft-repeated efforts to clear the throat, with the hoarseness upon using the voice, indicate, to some extent, the nature of the disease. This hoarseness is likely to increase as the day advances, and is often relieved by a night's sleep. Still, there are other laryngeal troubles which will produce similar symptoms, and the use of the laryngoscope is required to make the diagnosis sure.

By its use the mucous membrane of the larynx will present the ordinary appearances of chronic inflammation. The arytenoids and ventricular bands will be slightly swollen and hyperæmic. The vocal cords may be somewhat congested, but there will be no great swelling or tumefaction, no irregularity of motion, little or no surface-lesion; but there may be slight bathing of the parts in mucus. Sometimes the minute laryngeal vessels may be swollen and tortuous, particularly on the posterior surface of the epiglottis; and, in severe cases, they may be distinctly seen on the vocal cords. Minute granulations may also appear on the vocal cords and intralaryngeal walls.

Prognosis.—As this disease so frequently owes its origin to lesions in the upper air-passages, the prognosis is usually good, when these are removed; when the cause is chiefly voice-abuse, let this cease and the disease will likewise. A large number of cases, however, are of a very chronic character, when they come under the physician's notice. The laryngeal mucosa is thickened; the secretions, although not copious, have become habitual; and cure can only be accomplished by slow process. When the voice is not an important factor in the vocation of the patient, the disease may remain stationary in many cases without producing serious harm. Still, the fact that every fresh cold may result in an acute or subacute attack of laryngitis in the already

diseased organ, would indicate that amelioration should be aimed at in all cases.

Treatment.—As chronic laryngitis occurs, as a rule, in persons otherwise enjoying robust health, little is required in the way of systemic treatment. If the liver is torpid a cholagogue may be given, and saline cathartics may be administered when the plethora of the system demands it.

In cases where naso-pharyngeal lesions have produced stenosis or catarrhal disease in the upper air-tract it becomes the imperative duty of the medical attendant to aim at their removal. The only question is: Should this be accomplished at the time when the laryngeal symptoms are most urgent or at a later date? The answer to that depends upon whether we are called to treat the larynx in its chronic condition or in one of the acute exacerbations with which it is so often attacked. In the former, operation upon the turbinateds, septum, nasal polypi, adenoids, or tonsils, when required, should be done at once. In the latter, while we may alleviate the stenotic symptoms by lavage, etc., it should be the aim to reduce the acute laryngeal condition before completing the naso-pharyngeal treatment.

For local treatment of the larynx I believe there is no instrument so generally useful as the atomizer. When properly constructed and carefully used, the fluid contained in it can be applied thoroughly to the intricate foldings of the larynx. To accomplish this object the atomizer should have a curved tip at right angles to the shaft of the instrument. When using it the tongue of the patient should be protruded to its full extent, and, if necessary, held in position by the patient grasping it lightly in the folds of a doilet. If we desire the application to reach the infraglottic region, the patient should be instructed to inhale steadily and forcibly while the spray is thrown in. If the solution is intended to come in contact with the entire upper surfaces of the vocal cords, or to wash out the ventricles of Morgagni, or both of these, the patient should articulate the sound "ah," prolonging out the note while the spray is thrown in.

As there is always more or less mucous or muco-purulent secretion in the pharynx as well as the larynx, the first solution used by the atomizer should be one of the alkaline preparations already mentioned. With this the throat should be thoroughly washed. Then, if the condition is temporarily of an acute character, a 1-per-cent. solution of cocaine may follow. This will relieve the immediate tenderness and enable an astringent spray to be used without producing sore-

ness. If it is simply the chronic condition that requires to be treated, the cocaine may be omitted.

Of the astringents now to be applied, the following may be considered in order of merit:—

Argent. nit. in solution, 1 to 3 per cent.

Zinci chloridi in solution, $\frac{1}{2}$ to 1 per cent.

Cupri sulphas in solution, 1 to 3 per cent.

Tannic acid, 2 to 5 per cent., with glycerin, 10 per cent., in water.

Any of these may be thrown into the larynx and retained as long as possible, the patient returning daily to the office for treatment, or at longer intervals as may seem advisable.

For the interim treatment to be carried on at the patient's home, I have always obtained better results from the stearoptene preparations dissolved in one of the hydrocarbons than from the use of aqueous solutions. Among the advantages of the oil sprays over the water ones are the fineness of atomization, the softness of the touch upon the inflamed tissues, and the consequent greater penetrability within the folds of the organ, owing to the absence of the resistance which the coarser spray produces.

The preparations are much the same as those already mentioned in speaking of the treatment of pharyngeal disease, but to save the trouble of reference may be spoken of again here. Albolene is only taken as a good example of the hydrocarbons.

Menthol in albolene, 1 to 3 per cent.

Thymol in albolene, $\frac{1}{2}$ to 1 per cent.

1.	R	Menthol	35
		Ol. caryoph.	67
		Albolene .....30	

2.	R	Thymol	067
		Menthol	35
		Ol. anisi	67
		Albolene .....30	

1.	R	Menthol	gr. v.
		Ol. caryoph.	mx.
		Albolene	5j.

M.

2.	R	Thymol	gr. j.
		Menthol	gr. v.
		Ol. anisi	mx.
		Albolene	5j.

M.

For finer atomization to the throat, stronger solutions can be used by means either of the nebulizer or the comminutor. The American nebulizer is well adapted for home-use by the patient. As seen in Fig. 119, the heavier oil-globules are thrown against the wall of the bottle, and flow back into the fluid, while only the vaporous particles pass out of the mouth of the tube in a mist, to be inhaled by the patient.

The multiple comminutor is a more elaborate development of the same principle. By its use several vapors can be combined at one time for inhalation, if considered desirable. Its use is specially designed for the physician's office (Fig. 120).

Any of these can be used by the patient to the throat with a good atomizer or nebulizer two or three times a day. To have the best



Fig. 119—American nebulizer.

effect he should be instructed to inhale deeply while using the instrument. In any case the oil solution should not be too strong at first, the proportion of the drug within the menstruum being easily increased to suit the susceptibility of the patient, and also the kind of instrument by which it is to be applied.

Any of these preparations have the additional advantages of being antiseptic and cooling, as well as astringent.

In using nitrate of silver I prefer to apply it with the laryngeal cotton-holder after cocainization, guiding it to the part to which it is applied by the use of the throat-mirror, and using care to avoid abrasion of the surface by the manipulation. The use of the laryngeal brush in these cases, while more easily applied, is always more diffuse in its application.

Some operators advise the application of astringents in a dry form by means of insufflators, but the method is generally conceded not to be as efficacious as the one already referred to.

Counter-irritation over the larynx may also be of benefit; also



Fig. 120. Multiple comminutor.

painting the surface with iodine. In some cases, where there is actual doubt in diagnosis, the administration of iodide of potassium may help to clear up the difficulty.

Care in the use of the voice is imperative.

CHAPTER LXXI.

ATROPHIC LARYNGITIS

THIS is a variety of chronic laryngitis occasionally met with. Like ordinary chronic laryngitis, it is a sequel or result of disease of the upper air-passages. As also chronic laryngitis is usually the thickening of the mucosa of the larynx, resulting indirectly from thickening or hypertrophy of the nasal and pharyngeal tissues, so, likewise, atrophic laryngitis, like pharyngitis sicca, is an indirect result, if not extension, of a similar disease from the nose and naso-pharynx.

Like atrophic rhinitis, it is characterized by diminished secretions and crust-formation over the surfaces of the laryngeal mucous membrane. There is also pallor and shrinkage of the normal tissues of the parts affected.

Pathologically it is identical with the disease of the nose from which it originated, and is accompanied by similar pathological changes. Loewenberg's *ozæna diplococcus* has also been found within the crusts of the larynx; and, if the microbic origin of the disease may be granted, the like spores will be present wherever the disease may be located.

Symptomatology.—Crust-formation is much more severe during the night time than the day, owing to the quietude of the larynx during the hours of sleep. In the morning, particularly, there is a sense of harshness in the larynx, with considerable difficulty of clearing away the accumulated discharges. The masses expectorated come directly from the larynx, and are usually of a greenish color, and possess, though in a minor degree, the heavy earthy odor characteristic of atrophic rhinal disease. On examination of the laryngeal mucosa the surfaces may be found abraded or even ulcerated and the expectoration may be tinged with blood. It is not unusual in atrophic laryngitis for ulcerations to be extensive, particularly when the disease has extended to the infraglottic region. In this respect atrophic disease of the larynx differs materially from atrophic rhinitis, in which ulceration so rarely occurs; this is, probably, due to the greater mobility, thinner tissue-covering, and less vascularity of the larynx itself. I have seen one

case in which the front portions of several of the upper rings of the trachea were completely destroyed by the erosion, only minute side-fragments of the rings being left. When the vocal cords become involved in the disease, or when crusts form over the interarytenoid region, the voice is not only hoarse, but often aphonic.

Diagnosis should not be difficult. Presence of atrophic rhinitis and pharyngitis sicca would lead to the impression that any serious laryngeal trouble partook of the same nature. When, added to these, are foul, oral breathing, irritation of lower throat, sensitive hyoid, cough with expectoration of greenish crusts, hoarseness, and great difficulty in clearing the laryngeal cavity, there is little likelihood of mistaken diagnosis. Examination with the laryngoscope should remove any remaining doubt. Unless there has been thorough cleansing of the larynx, immediately before examination, the peculiar greenish crusts of the disease will be seen in position, above or below the glottis, or both. If they have already been removed, the flattened and shrunken and perhaps ulcerated mucosa will be seen, generally pallid in color, and perhaps streaked with blood, if hæmorrhage has taken place. When the disease is extensive, the crusts adhere to the infraglottic region more tenaciously than the supraglottic, owing to the more abundant supply of glandular secretions above the vocal cords.

Prognosis. If taken early in its history, cure may be possible, but it must be remembered that it owes its origin to long standing nasal disease, which may be incurable by the time that the laryngeal atrophy has developed. In these cases amelioration is all that can be expected. If, on the other hand, the atrophic rhinal condition can be removed by treatment, the laryngitis sicca should likewise, as a consequence, be arrested. There is another thing to be remembered, that as atrophic rhinitis under proper care ceases to present severe symptoms in old age, the like result may be expected in the history of the laryngeal disease.

Treatment.—The first and most important element in treatment is to place the nose and naso-pharynx in as healthy a condition as possible; the treatment required has already been described when dealing with these organs. This having been done at each sitting first, the like procedure should at once be applied to the larynx as well.

For first cleansing nothing is better than a free spray of Dobell's solution, thrown forcibly into the larynx with the down tip of the atomizer. If the crusts are difficult to remove, the coarser spray of a curved laryngeal syringe may accomplish their loosening more effect-

ually. With the aid of compressed air and a Davidson atomizer, there should never be any difficulty.

In rare cases the use of the laryngeal brush or cotton-holder may be required to detach the crusts. I never saw a case, however, in which this was necessary.

As second treatment to be applied each time after the use of the cleansing spray, the application of the various metallic solutions are recommended. From my own experience, I again prefer, for their mild protective influence, the use of the various hydrocarbons: albolene, glycolin, etc. With the oil may be combined from $\frac{1}{2}$ to 1 per cent. of carbolic acid, creasote, or thymol. This should be used several times a day by the patient, with instructions to inhale deeply while using the atomizer.

When the case is severe, the home use of the steam-inhaler containing a weak solution of any of the drugs mentioned will have a beneficial effect.

CHAPTER LXXII.

PACHYDERMIA LARYNGIS.

THIS is a disease which may occur: (1) in the region of the vocal processes of the cords; (2) over the internal surface of the interarytenoid commissure. The first is the verrucous form of pachydermia, the second the diffuse. Both indicate a thickening of tissue: the former circumscribed, the latter irregularly hypertrophic.

Pathology.—Histological sections taken from the vocal processes are oval in form, grayish in color, and, according to Damieno, are composed of pavement-epithelium, being changed into epidermoidal layers of flattened cells without nucleus, the mucous membrane at the point affected being apparently transformed into tissue resembling stratified skin. In this variety the epithelial tissues thicken at the expense of the submucous connective tissue, which in some cases is almost absent.

In the interarytenoid pachydermia there seems to be a local overgrowth of all the tissues, the connective tissue as well as the epithelial elements being affected. The overgrowth is usually fissured deeply from above downward.

While the one class of cases has its origin in the pavement-epithelium of the cords, the other arises from the ciliated epithelium of the commissure.

Etiology.—The cause is supposed to be the presence of chronic laryngitis, whether occurring upon the cords or between the arytenoids. In singers and speakers overuse of the voice undoubtedly has an influence in the development; naso-pharyngeal hypertrophy is also in some cases a factor in the etiology of the disease. One well-marked case of interarytenoid pachydermia, occurring in a lady-vocalist, I traced to the presence of adenoid vegetation, and another in a gentleman to throat catarrh occasioned by the total removal of the uvula. In the former, ablation of the adenoids, together with brushing the pachydermia with solution of nitrate of silver, resulted in complete cure without return. In the latter a change to a more equable climate had a favorable result.

Symptomatology.—When the nodes occur upon the cords, general symptoms are very slightly developed. There may be weakness of the voice, however, attended by huskiness or hoarseness, owing to the projection of the hypertrophied nodules from the margin of the cords; but there is little, if any, soreness and no coughing or expectoration.

When the diffuse condition exists, there is more secretion, more soreness, and laryngeal distress, owing to the fact that the projecting growth between the arytenoids may prevent the complete closure of the cords; the voice becomes affected, and the patients complain of aching and general fatigue of the larynx.

Diagnosis.—As pachydermia of the cords is largely an epithelial development, there is some danger of mistaking it for epithelioma; and in some instances it has been asserted that the pachydermia really developed into cancer. Damiano declares that these were cases in which the epithelioma really existed prior to or in combination with the pachydermia, not as a result. The essential difference between the two diseases exists in the fact that in cancer there is true proliferation of epithelial cells, the cellular nuclei being most active, and the epithelial products penetrating everywhere among the lymphatics and blood-vessels, while in pachydermia there is no true proliferation, but hypertrophy of the epithelium as it takes place in a corn, the cellular nuclei becoming atrophied and disappearing.

In diffuse pachydermia there is danger of its being confounded with laryngeal tuberculosis in the stage of hypertrophy and infiltration, prior to ulceration. The general condition and absence of other tubercular symptoms, together with microscopical examination of the secretions from the larynx, however, should render the diagnosis tolerably certain.

Verrucous pachydermia, or pachydermia conscripta, as it is sometimes called, is in the form of little, hard nodules situated on or near the vocal processes. In rare instances they are found at the junction of the anterior and middle thirds of the cord. They are white or slightly pink in color and about a pin's head in size. In the typical form the nodule may be single. During vocal effort it comes in contact with the opposite cord. This at first produces an indentation, which by and by gives way to proliferation and the development of another node. Then the two, coming in contact, prevent proper closing during vocal effort.

Prognosis.—Nodes of the vocal cords of speakers and singers would frequently disappear of themselves, if prolonged and complete

rest of the voice were practiced. It is rare, however, that this can be accomplished. Treatment alone, without rest, is of little avail, but the two combined should in all cases produce a good result.

In the diffuse interarytenoid pachydermia, fissured thickening having occurred, spontaneous absorption is exceedingly rare.

Treatment.—In the pachydermia conscripta, as said before, some cases will get well of themselves if the voice is given sufficient rest. In mild cases, where the nodules are small, brushing with 25- to 50-per-cent. solutions of lactic acid or 10-per-cent. solution of nitrate of silver will result in their removal. Before the brushing a spray of 4-per-cent. solution of cocaine would be required, to still the larynx, so as to enable the application to be confined as much as possible to the diseased parts. The treatment may be repeated at intervals of one or two days while required.

In severe cases authors differ greatly in the treatment they advise. Professor Chiari recommends the use of electrolysis. Heryng, when the nodes are any size, advocates thorough cocaineization and then the snipping off of the projecting nodules. Some recommend the use of a fine snare, and Gottstein advises the use of the galvanocautery point.

In diffuse pachydermia, consisting of so much hypertrophic tissue, the treatment may require to be more vigorous to effect a removal. Under cocaine a 50-per-cent. solution of lactic acid, applied by means of a laryngeal cotton-holder at intervals of two or three days, will in some cases promote absorption, while in others a 15- or 20-per-cent. solution of nitrate of silver used in a similar way will effect a like result. It usually takes weeks or months of careful treatment to accomplish this.

In severe cases scraping the hypertrophic tissue with Krause's curette, as in the treatment of tubercular infiltration, has been found of service. This is done after thorough cocaineization, and is followed up by rubbing the raw surface freely with the lactic-acid solution, the operation to be repeated if required.

Personally I have seen four cases of the diffused variety (*British Medical Journal*, November, 1897). Two were treated by brushing with solution of nitrate of silver and two by brushing with solution of lactic acid. All recovered, although one required treatment for a year and a half. Another had threatened return as the fall of the year approached, and was obliged to seek residence in a milder clime.

One case of node of right cord, occurring in a minister, finally disappeared under repeated sprays of 4-per-cent. of menthol in al-

bolene, together with complete rest of the voice for a number of weeks. In a second case, the patient being a lecturer, applications of solution of nitrate of silver after cocainization, together with spray treatment, resulted in cure.

SUBGLOTTIC CHRONIC LARYNGITIS, which Gehrardt terms "chor-ditis inferior hypertrophica," owing to the fact that it is attended with local subglottic hypertrophies, sometimes occurs, and is likely to be productive of a serious degree of laryngeal stenosis. The "chronic blennorrhœa of Stöerck" likewise produces hypertrophies and cicatrices, but *on* the vocal cords, instead of between them. Klebs says that histologically the elements in blennorrhœa resemble those of rhinoscleroma. It is a question whether both conditions are not of the nature of pachydermia. (Lennox Browne.)

Treatment would consist of dilatation, with or without tracheotomy, as the indications of each case might call for.

CHAPTER LXXIII.

PSEUDOMEMBRANOUS LARYNGITIS.

As TRUE or pseudomembranous croup is believed by the majority of physicians to be laryngeal diphtheria, it will not be treated of in this volume, inasmuch as it is fully discussed in works upon general medicine.

There are cases, however, of traumatic pseudomembranous laryngitis to which a brief reference might be made. It is reasonable to suppose, also, that if pseudomembranous rhinitis does occasionally occur, of a purely idiopathic character, with the total absence of the Klebs-Loeffler bacillus, so also might a similar disease occur in the larynx under favorable conditions.

Of traumatic origin, I have had one case which occurred in August, 1892, that of a young lady aged 25. Galvanocautery operation upon the tonsils was followed three days later by intralaryngeal membranous laryngitis. In this there was no continuation of membrane from the tonsillar operation. The epiglottis was unaffected and the membrane was formed upon the ventricular bands down to the vocal cords, the latter being slightly involved in the coating. There was some laryngeal stenosis and complete aphonia, with temperature of 100°. Treatment was by steam-inhalation and iron and glycerin internally. In four or five days the membrane had gradually disappeared. There was no recurrence. The case had no connection whatever with diphtheria, as there were no cases either before or afterward in that neighborhood. The probability is that it was a pure fibrinous deposit of staphylococcic origin.

At the Laryngological Society of Paris, January, 1894, Courtade reported a case of "recurrent subglottic pseudomembranous laryngitis" in a female aged 25 years. For eight days the patient had suffocative attacks after meals and at night. Two years before she had a similar illness lasting fifteen days. Laryngoscopic examination revealed a whitish-gray plaque beneath the cords. Antispasmodic remedies relieved the symptoms, and coughing expelled four grayish flakes the size of the little finger-nail and the thickness of a ten-cent piece. The

aphonic voice then became normal, and laryngoscopic examination revealed the mucous membrane of the ventricular bands, the arytenoids, and the subglottic region of a deep-red color, but without trace of exudation.

At the Laryngological Section of the International Medical Congress held in Moscow, in 1897, Rosenberg reported a case of laryngitis fibrinosa in a man aged 67. No infection could be traced. The disease lasted eight days, and was marked by patches of membrane upon the epiglottis and inner walls of the larynx, the zones surrounding the affected spots being quite red and inflamed. The mucous membrane and *plaques* were examined microscopically. No diphtheria bacilli were found, but staphylococci and streptococci were, and the false membrane was fibrinous.

Middlemas Hunt also reports a case of recurrent membranous laryngitis which had existed off and on, in a middle-aged lady, for 19 years. The membrane would form, accompanied by acute sore throat, and would last for a week or two, and then disappear for a similar period, to be followed by another attack. It was always located to the left side. Staphylococci and streptococci would be found, but no Klebs-Loeffler bacilli.

CHAPTER LXXIV.

LARYNGEAL PERICHONDRITIS

THIS is a rare disease, occurring sometimes as a result of syphilis, tuberculosis, or cancer of the larynx. In a few instances, as in the cases of Newman and Jurasz, it develops as an acute idiopathic affection; occasionally it occurs as a sequence to one of the exanthemata. It comes on very suddenly, is attended by the gravest symptoms, and is sometimes so obscure in its manifestations that a positive diagnosis becomes exceedingly difficult.

Pathology.—There is at first increased vascularity in the perichondrium of the cartilage. This gradually extends to the cartilage itself, with increased cell-formation and swelling. This may be followed by formation of pus beneath the perichondrium, separating it from the chondrium and involving the latter in necrosis, or, by slower process, cell organization and hypertrophy may take place.

Of all the cartilages the cricoid is most frequently affected in the acute idiopathic disease, and, as a rule, the inflammation confines itself to the cartilage primarily involved. In tuberculous cases the arytenoids are the most frequent seat, and in these the inflammatory action usually extends also to the cricoid. As regards frequency of development, Bosworth, out of 33 cases collated, found that 23 involved the cricoid, 3 the thyroid, 4 the arytenoid, 1 the cricoid and thyroid, and in 2 cases all the cartilages were involved. Lung, out of 55 cases collated, found disease of the cricoid in 22, of the cricoid and arytenoid in 14, of arytenoid in 9, of thyroid and cricoid in 5, of thyroid, cricoid, and arytenoid in 3, and of thyroid in 2.

Etiology. As a single cause, perhaps exposure to cold may claim the greatest number. It is likely, however, that some acquired or inherited weakness of constitution has in each case been a predisposing factor. Typhoid fever, scarlatina, diphtheria, tuberculosis, syphilis, etc., are also exciting causes, as also is traumatism. The majority of cases occur in males, and the period is during adult life.

Symptomatology.—In very acute cases the disease is likely to be ushered in by a well-marked chill and localized pain. As a rule, however, as there has been some previous indisposition, the chilliness may be mild or even absent. Fever follows of two or three degrees, with

pain in the bones and general distress of the system, arising from the approaching difficulty of respiration and deglutition.

When the cricoid is affected, the swelling on the inner surface of the cartilage seriously interferes with breathing, both inspiration and expiration being prolonged and difficult. The tumefaction and soreness will also interfere with deglutition. When the arytenoids are involved, the closing of the glottis cannot be completed, and breathing may be easier than with cricoid stenosis, while odynphagia and dysphagia will both be more severe. Perichondritis of the thyroid cartilage is usually on the inner surface and unilateral. In this case the voice, although hoarse, may not be entirely lost; when bilateral it usually is. The epiglottis being composed of fibrocartilage instead of simple cartilage, possesses more power of resistance, and is rarely, if ever, attacked by idiopathic disease.

In acute cases the symptoms may reach their utmost severity in a very few days, while in chronic ones they may exist a much longer time without producing severe stenosis.

Diagnosis.—The suddenness of the attack, accompanied by stenosis and fever, with the absence of diphtheritic symptoms, may give some idea of the nature of the disease. Still, it may not be easy to arrive at a correct conclusion, even with the aid of the laryngoscope. With the development of abscess, there is more or less œdema; and, although the attending fever may distinguish it from simple œdema, yet the laryngeal images of the two are sometimes so much alike that doubt may be occasioned. When the swelling is not great enough to obliterate the view of the infraglottic region, the unilateral character of the perichondritis, with the swelling on the one side and the consequent visible distortion of the larynx, will aid in diagnosis. This is particularly the case with the supraglottic cartilages, but with the cricoid, the disease being almost centrally situated and the swelling widely diffused, it is often impossible for the laryngoscope to reveal anything but general œdema of the parts.

This was particularly the case in a man, aged 50, whom I saw in consultation some years ago. Acute laryngitis of some sort, accompanied by difficult respiration, came on suddenly. In forty-eight hours from the supposed commencement of the attack I was summoned. The man was anæmic; breathing was stertorous, inspiration was more difficult than expiration. He had no pains and could walk about with ease; temperature, 100°. By the laryngoscope the larynx was found to be œdematous. Both arytenoids and epiglottis were

swollen. Vocal cords could not be seen. By using spray of cocaine and menthol in solution breathing became slightly easier. It did not seem advisable to perform tracheotomy immediately, particularly as the patient wanted any operation postponed as long as possible. I did not see him again alive, as the following day he was thought to be easier. The succeeding night the stertor became more severe. The doctor was summoned. When he arrived half an hour later the patient was dead.

At the post mortem we discovered an extensive perichondrial abscess, extending more than half-way round the inner surface of the cricoid. A portion was to the right side, but, after extending over the anterior surface of the posterior half of the ring, it largely filled in the



Fig. 121.—Abscess of cricoid. Larynx opened from behind. The dark spot below the centre and to the left side indicates the larger opening; the lighter spot to the right, the smaller one.

left side, the cartilage itself being denuded and disorganized. The other cartilages were in no way affected (Fig. 121).

I was informed by a member of the family that a brother of the deceased died of the same trouble several years previously.

Prognosis. — The immediate danger is from laryngeal stenosis. In chronic cases this comes on so gradually that there is time for consideration before operation is required. As disease of the cricoid produces the most extensive swelling, it is usually attended by the most danger. When several cartilages are involved, the prognosis is most unfavorable. In nearly all cases, however, life might be prolonged if tracheotomy were performed comparatively early in the disease. The presence of the purulent sac within the larynx would preclude the advisability of intubation.

Treatment.—When the progress of the disease is slow enough to allow of systemic treatment, this may be tried in the way of antiphlogistic and diuretic measures. In cases in which the oedema is not too great to permit of laryngeal observation, the point of protrusion may be freely opened by the laryngeal lancet, after which inhalations of steam will favor a free discharge. When pointing externally, it should be opened early and discharge encouraged.

In cases of severe stenosis, however, whether from the oedema of the parts or the pressure of the pus-sac, tracheotomy is always advisable. Artificial respiration once established, efforts can be made to more thoroughly treat the perichondrial inflammation, and when required it is possible that the diseased cartilage itself might be removed, in the absence of systemic disease.

Supporting treatment, when there is any prospect of prolonging life, is always called for, and, owing to difficulty in deglutition, recourse may be had to enemata.

The case I referred to is one in which I believe tracheotomy should have been done at the time of my first and only visit. There is little doubt but that it would have prolonged the patient's life; and I have often regretted since that I did not insist at the time upon giving him the required relief.

AFFECTIONS OF THE CRICOARYTENOID ARTICULATION

De la Sota was the first to describe primary inflammation of this joint due to exposure to cold, and Debrousses, in 1861, was the first to express the opinion that such a trouble might be rheumatic in character.

When it is remembered that the cricoarytenoid articulation is supplied, like the other joints of the body, with capsule and ligaments and a true synovial membrane, besides possessing slight rotatory and lateral movements, it is but natural to believe that it may be subject to the usual run of joint diseases. The investigations of more recent observers have borne out this idea.

In 1880 Archambault wrote that acute laryngeal manifestations of rheumatism were more common than was generally supposed, and that one of its manifestations was in the articulations.

In 1887 George W. Major, of Montreal, drew attention to several affections by which the cricoarytenoid articulation was sometimes invaded. These were sprain, dislocation, direct local injury, acute in-

inflammation, and ankylosis. Of these, he gave instances, ankylosis of the joint being the most common. The chief causes mentioned are perichondritis, rheumatism, gout, the exanthems, and catarrhal affections; the chief of these is rheumatic inflammation of the joint.

The leading symptom is embarrassed breathing. The voice is not much interfered with and swallowing, as a rule, is not difficult. Enlargement of the joint may be present, but there may be, in advanced cases, atrophy instead. Other symptoms are external tenderness and friction-sounds on manipulation.

Six years later, in an elaborate and valuable paper, bearing the title of "Arthritis Deformans of the Larynx," Casselberry gave the history of an exceedingly interesting case. This occurred in a lady aged 58. She was a subject of general arthritis deformans, the joints of both sides of the body being affected alike. The hands and wrists were distorted, the fingers and thumbs dislocated, and the feet and ankles similarly affected, though in a minor degree.

The cricoarytenoid joints were also ankylosed on each side alike. The vocal processes of the arytenoids were similarly affected, the swelling extending to the cords themselves. The posterior ends of the cords were both thickened, projecting downward and upward and beyond the natural line of the rima glottidis. The abductor muscles were so limited in their action as to prevent material opening of the glottis.

The history of this case proved that it was in no sense one of paralysis, and, strange to say, neither did it seem to be one of gout or rheumatism. This lady had never suffered from pain in any of the joints during the development of the disease, and, what is more, medicines administered for the relief of gout or rheumatism had not had the slightest effect in arresting the progressive deformity. While under Casselberry's care sprays and inhalents afforded temporary relief.

Newcomb has also written upon the "laryngeal manifestations of rheumatism," dwelling particularly upon its development in the cricoarytenoid joint, the symptoms being similar to those described by Major. He speaks also of the deeper congestion which occurs along the line of contact between the articular surfaces of the cartilages affected.

Concerning treatment of the rheumatoid condition, nothing has yet been found to take the place of the salicylates. Salol, or salicylate of phenol, is a good addition to the group. Ingals has found much relief in these cases from a combination of salol and extract of *phytolacca* in $\frac{1}{4}$ -gramme doses of each. Guaiac is also sometimes useful.

CHAPTER LXXV

TUBERCULOSIS OF THE LARYNX

This disease is said to occur in from 10 to 20 per cent. of all cases of pulmonary tuberculosis. In a large majority of cases it is secondary to that affection, although in a certain proportion of cases it exists as a primary disease. Bosworth takes the ground that the tubercular process has added virulence as it occurs nearer the outer world, while at the same time it occurs with less frequency, the ratio being inverted. That is to say, that, while pharyngeal tuberculosis is the rarest of tubercular manifestations, it is the most rapidly fatal. And laryngeal tuberculosis, occupying a medium position between the pharynx and lungs, also occupies a median position, both with regard to severity and frequency of the disease. Hence it is less frequent, but more rapidly fatal, than simple pulmonary tuberculosis.

Pathology.—The morbid process of tuberculosis is essentially the same, whatever part of the body it occurs in, being based upon the presence of the tubercle bacilli in the affected tissue. In the large majority of cases the formation of tubercle within the larynx is secondary to primary pulmonary disease. In rare instances it may arise in the larynx *de novo*.

In the earliest stages of laryngeal tuberculosis there is infiltration of the mucous membrane of the parts affected, with multiplication of round embryonic cells, lymphocytes, and leucocytes. In the central portion of the periphery these small cells may aggregate more densely, resulting in necrosis and ulceration of the part, with deposit of cheesy matter in the submucous layer. Quite frequently, although the tubercle bacillus is considered the primary agent, it may be difficult to discover it microscopically. Usually the nodular or tubercular deposit is at first subepithelial, gradually working toward the surface, and resulting in ulceration. In nearly all cases the disease is progressive, the spots of disintegration multiplying as the tuberculosis extends.

The amount of infiltration varies in different cases. In some it is very superficial, and, according to Clifford Beale, this class of cases is very much more amenable to treatment than when the disease extends to the submucous layer.

When of recent development, the ulcers are shallow and superficial, with jagged edges, the base being gray and smooth. On the other hand, old ulcers are irregular, studded with hollows and small cavities, around which the tissues are sclerosed.

The most frequent site is said to be the arytenoid commissure, next the arytenoids, ventricular bands and cords, and perhaps last the epiglottis, although authorities differ as to the frequency with which the last mentioned is affected.

In some cases, although the arytenoids, commissure, and ventricular bands may be involved, the cartilages being ulcerated and eroded, the vocal cords may remain intact even to the last. In other cases they are the chief seat of the disease, one or both being thickened and jagged for the whole length of the border. When the perichondrium is seriously invaded by necrosis, extensive œdema of the submucous tissues is likely to ensue.

Etiology.—Tuberculosis of the larynx is usually a local manifestation of a systemic disease. It is rarely primary in origin, but dependent upon a pulmonary tuberculosis already present. Granting, however, a constitutional weakness, abrasion or relaxation of the laryngeal mucosa may, in some cases, permit the invasion of the bacillus and the primary development of the disease within the larynx.

Hereditary tendency has an undoubted influence in the etiology of this disease. Catarrhal pharyngitis and laryngitis, as well as continued exposure to cold and wet, may also be classed as predisposing causes.

As tuberculosis usually occurs in the lungs first, autoinfection is believed by many to be the chief cause of its occurrence in the larynx, any abrasion of the mucous membrane of that organ giving ready lodgment to the tubercle bacilli, on their way outward in the act of coughing; or invasion may occur through the medium of the lymphatic vessels with which the larynx is so freely endowed.

Tubercular laryngitis occurs more frequently in males than females. It is also a disease of adult life, by far the largest number of cases occurring between the ages of twenty and forty years.

The percentage of cases of pulmonary tuberculosis which are followed by tuberculosis of the larynx is variously estimated by different writers, the figures being between 10 and 30 per cent. Perhaps the medium of 20 will be the nearest to the truth.

Symptomatology.—Impairment or softening of the voice is one of the earliest symptoms. This is to be distinguished from the harsh

voice, with lowered pitch, resulting from simple chronic laryngitis. In this disease the muscles of the larynx are weakened and relaxed, while the infiltration, which so frequently occurs at the arytenoid commissure, prevents the proper vocal adjustment of the cords, with consequent loss of voice even to the extent of aphonia, as the disease progresses.

When the disease is unilateral and situated entirely above the vocal cords, or located in the epiglottis to the exclusion of other points, impairment of voice may not be present.

Pain is a frequent symptom, especially during deglutition. When the upper portions of the larynx, such as the arytenoids and epiglottis are affected, the pain is usually more acute, and after ulceration has commenced may be very severe.

Cough is probably present in all cases, the pulmonary cough being notably increased by the laryngeal irritation.

There is also, particularly when oedema exists, a feeling of fullness in the region of the larynx, which is very distressing to the patient.

The expectoration in the early stage as coming from the larynx is limited. As the disease advances the secretion becomes more abundant, and consists of gray,ropy mucus, as distinguished from the heavy, muco-purulent matter, the product of pulmonary disease.

The ordinary systemic symptoms of tuberculosis will more rapidly assume an aggravated form upon the addition of the laryngeal disease. Emaciation comes on more quickly, mental anxiety is greater, and the pain sustained by the patient is more severe than when pulmonary tuberculosis exists alone.

Diagnosis. When the examination of the lungs indicates tuberculosis, particularly if microscopical examination of the sputum discovers the presence of tubercle bacilli, any decided softening of the voice, together with laryngeal pain, will render the diagnosis of laryngeal tuberculosis almost certain. Laryngoscopic examination, however, will always be necessary to make positive the location and extent of the disease. In cases, too, where the lungs are affected to only a limited extent or not at all, the only certain way of arriving at the truth may be by the use of the laryngoscope.

In this disease the mucous membrane of the larynx and even the pharynx will have lost to a large extent its accustomed pink color and be more pallid in appearance. This will distinguish the tuberculosis from the hyperæmia of syphilitic and malignant disease.

This pallor, with swelling or infiltration, is the earliest local sign

revealed by the laryngoscope. The swelling is confined to the spot involved in the disease, the pallor being diffused over the surrounding tissues. The infiltration is at first unilateral, but may soon extend to the opposite side, assuming, in the case of the arytenoids, the club-shape, and, in the epiglottis, the turban form.

Prior to ulceration the membrane of the swollen tissues is of a dull-gray-yellowish tinge, smooth and moist, but without the semi-transparent appearance of healthy mucous membrane. As the disease advances, minute yellow spots of tubercle may be seen dotting the infiltrated tissue. They form on the mucosa beneath the epithelium. As they enlarge, they project a little above the surface, and, gradually breaking down, leave an ulcerated surface. These ulcerations are shallow and differ little in color from the surrounding tissue. As they extend, the surface assumes an irregular worm-eaten appearance, and, although there is consequent loss of tissue, this is less apparent, owing to infiltration which prevails beneath and around the ulcer. Any granulations that occur are usually of a pale-pink color.

When the epiglottis is the seat of the disease, loss of tissue frequently extends rapidly, the greater part or even the whole of the organ being gradually eaten away by the ulceration. The pallor of the tissues, the shallowness of ulceration, the results of microscopical analysis, together with the local and systemic symptoms, should render the diagnosis certain.

Prognosis. This is exceedingly grave. The large majority of cases die, and, as it is usually a secondary manifestation, its presence only adds speed to the coming fatal issue. Still, cases do recover, and a number are on record in which the laryngeal tuberculosis has been completely removed, although the patient has ultimately died of original pulmonary disease.

After extensive personal observation, as well as investigation of records, Besworth has arrived at the conclusion that the average duration of life in pulmonary tuberculosis uncomplicated is three years; complicated with laryngeal disease, two years; and duration of life after larynx has become involved, one and one-half years.

Although pulmonary consumption is, in some instances, a curable disease, the records of post-mortems proving that many people die of diseases other than tubercular, although exhibiting cicatrices within the lung-tissue arising from healed vomica, yet, when complicated with laryngeal tuberculosis, the former always eventually proves fatal.

Of late years, however, the cure of the laryngeal tuberculosis itself,

if taken early, is by many laryngologists believed to be possible, at least in numbers of cases, the life of the sufferer being thereby prolonged.

Treatment.—For general constitutional treatment, the demands made in behalf of laryngeal tuberculosis do not differ from those required when the disease is located in other organs of the body. Our province here, however, refers to the direct treatment of the local disease. In the early history of cases, and before operative measures can be deemed advisable, probably no method of treatment is of equal value to that of sprays, thrown by the atomizer directly into the larynx. Of all the medicaments that can be applied in this manner, I have found none so useful as different percentages of menthol in albolene. This may vary from 2 to 10 or even 20 per cent of the stearoptene in the oil, commencing with the lower number, and gradually making the proportion stronger as the patient is able to bear the application. Even after ulceration has commenced and the tissues of the larynx are gradually becoming disintegrated, the cleansing and soothing effects of the drug thus applied are always grateful to the patient. Bishop prefers camphor-menthol for this purpose, while others advise insufflations of iodoform, iodol, aristol, etc. When the pain is severe, occurring so frequently as it does in the advanced stages of the disease, solutions of cocaine are recommended for local application, on account of the temporary relief which they insure. In these cases, intrinsically hopeless, it is undoubtedly our duty to do all that is possible for the comfort and physical relief of the patient. Lennox Browne, Charles Knight, and many others believe that much can be accomplished by spray-treatment, and menthol in various proportions appears to be the drug that they rely most upon in these cases. Guaiacol in albolene or olive-oil in 30- to 60-per-cent. solution acts in a similar manner to the menthol and is worthy of trial.

Of direct local applications to be applied by means of the laryngeal cotton-holder, the one that is believed to be the most useful, and receives the widest professional support at the present time, is lactic acid. It was introduced in 1885 by Krause, and is used in various strengths from 25- to 100-per-cent. solution. It may be applied to the diseased tissue by brush or cotton-holder.

Parachlorophenol, 5 to 20 per cent, in glycerin is another remedy recently advocated by Simonowsky, applied as a pigment, and enzymol is spoken of by Murray as a most valuable adjunct to other treatment.

Intralaryngeal surgical treatment is the most modern and radical

means advocated for the relief and cure of this disease. Different lines of procedure have been followed with more or less success.

First and most prominent is curettement. Then follow submucous injections, electrolysis, and galvanocautery operations. Together with these methods, the regular throat treatment by lactic acid, brushing, etc., may be associated, according to the judgment of the operator.

As pointed out by Gleitsmann, fifteen members of the Laryngeal Section of the International Congress at Rome advocated curettement in suitably-situated cases. This is particularly applicable to the arytenoid and commissural regions. In advocating this measure he does so under the following conditions:—

1. In cases of primary tuberculous affections without pulmonary complication.
2. In cases with circumscribed ulcerations and infiltrations.
3. In cases with dense, hard infiltrations of the arytenoid region, the ventricular bands, and tuberculous tumors of the epiglottis.
4. In the incipient stage of pulmonary disease, with but little fever and no hectic symptoms.
5. In advanced pulmonary disease with distressing dysphagia, resulting from infiltration of arytenoids, as the quickest means to give relief.

Gleitsmann gives the following as contra-indications of curettement:—

1. Advanced pulmonary disease and hectic.
2. Disseminated tuberculosis of larynx.
3. Extensive infiltration, producing severe stenosis, when tracheotomy is indicated or laryngotomy can be taken into consideration.

The operation should be done under the free use of cocaine, and by means of Heryng's double curette.

Submucous injection of lactic acid has also its advocates. This is introduced into the affected tissue by an appropriate curved syringe. Creasote in the same manner is likewise advocated strongly by Chapelle.

Treatment by electrolysis, as taught by Scheppegegrell, is too recent to be worthy of strong advocacy yet. Galvanocautery operations have, however, been used to advantage, with or without the addition of curettement.

Tracheotomy and laryngotomy can only be considered advisable as last resorts, indicated to relieve extreme stenosis and dyspnoea.

As said before, general constitutional treatment is alike whether the disease be located in the larynx, lungs, or both, and should, me-

dically and dietetically, be, in the highest degree, of a supporting character. Codliver-oil, when purified and deodorized, is by no means an unpalatable agent; and is still largely and wisely used. Creasote has long been a favorite remedy in doses of $\frac{1}{4}$ cubic centimetre two or three times a day variously modified. Latterly, however, creosotal, or, more correctly, carbonate of creasote, has largely taken its place, inasmuch as doses containing several times this amount of creasote can in many cases be taken without in any way injuring the digestive system.

A very eligible way of administering the creosotal is in combination with purified codliver-oil, as:—

- | | | |
|--|----------------------|-----|
| 1 | R Creasote carbonate | 60 |
| | Ol morrh. opt. | 300 |
| M. Sig. Eight to sixteen grammes three times a day after meals | | |

With the best of treatment and care this class of cases, as already stated, cannot, on the whole, be considered hopeful; yet much can be done to relieve the sufferings, prolong the life, and in some way benefit the unhappy victims of this disease. Guaiacol is sometimes of benefit. Small doses of morphine and codeine may also be of advantage in allaying distressing symptoms.

R. Lake (*Journal of Laryngology, Rhinology, and Otology*, February, 1899) says that, while "general treatment is useless, one must not lose sight of the enormous aid one derives from increasing the powers of resistance in the body, and by increasing the numbers and energy of phagocytes and white corpuscles." Local measures he divides into surgical and non-surgical. The former consist in removing diseased portions, curdling ulcers, and depleting oedematous tissues by puncture, etc. The latter consist of insufflation of powders, painting on or rubbing in of solutions, the injection into the tissues of hypodermic remedies, and the injection into the trachea of oily solutions by syringes and atomizers. In using any "paint" to the larynx a brush should never be used, but always a cotton-wool mop, for the two reasons of cleanliness and efficiency. Brisk and firm friction are required, and all solutions should be as strong as possible. When injections are given the temperature should be about 80° F, the patient being instructed

- | | | |
|---|----------------------|-------|
| 1 | R Creasote carbonate | 3ij. |
| | Ol morrh. opt. | 3xij. |
| M. Sig. Two to four teaspoonfuls three times a day after meals. | | |

to inhale deeply, hold his breath immediately after the injection, and not to cough. The conditions attending laryngeal tuberculosis are divided into six clinical heads: 1. Granular condition of vocal cords. 2. Superficial excoriation or ulceration. 3. Œdema. 4. Œdema and superficial ulceration. 5. Deep ulceration. 6. Mixed œdema and deep ulceration. In Nos. 1 and 2 no method of treatment has been so efficacious as intratracheal injection. In Nos. 3 and 4 surgical treatment is required as well as the application of paints. Cutting-forceps do the most effective work. Formic aldehyde or lactic acid should be used after every intralaryngeal operation on a tubercular subject, no matter how small the operation. In Nos. 5 and 6 frictions and operations are useless as well as intolerant to the patient. In such cases insufflations of iodoform and orthoform will have a wonderfully soothing effect, particularly the latter, which is noted for its prolonged action. It is a non-toxic anodyne, producing anæsthesia of the parts for nearly twenty-four hours. The prognosis, under judicious treatment, is good under the first two divisions, fairly good in some of the third and fourth varieties, and universally bad in the other two.

CHAPTER LXXVI.

LUPUS OF THE LARYNX.

PRIMARY lupus of the larynx is not so rare as primary tuberculosis of the larynx, although both are believed to owe their origin to the presence of tubercle bacilli. As a rule, however, it is secondary in its origin, being derived from lupus of the pharynx, which itself had been an offshoot of lupus of the skin. In this, too, it differs from tuberculosis of the larynx in being sequel to an external disease instead of an internal one (Fig. 122).

To the comparatively long list of cases of primary origin already published, Mayer, of New York, has recently added two more. On



Fig. 122.—Lupus. Laryngoscopic appearance.
(After Lennox Browne)

examination of the report in the *Journal of Laryngology* in 1897, however, only one of these could be called purely laryngeal, and the other was a long-standing case under the care of Morris J. Asch, and was more pharyngeal than laryngeal. In this case the skin was for years unaffected, and the patient lived for eighteen years, finally dying of apical tuberculosis.

For the pathology and etiology of laryngeal lupus, reference to its history as occurring in the pharynx will cover the points of chief interest. The only point that need be further mentioned here is the one brought out by Lefferts many years ago, that the first pathological element of this disease is essential hypertrophy of tissue. This is followed by slow, but destructive, ulceration, to be succeeded by dense,

hard cicatrices. All three conditions may exist in the one larynx at the same time.

Symptomatology.—Primary lupus of the larynx may exist for a long time before developing symptoms. Like its congeners in the face and pharynx, it may exist almost indefinitely without producing pain. After awhile there may be slight huskiness, dyspnoea, and soreness. The secondary disease resembles the primary, but it is more readily discovered, owing to the primary indications. Huskiness may arise from involvement of the cords and commissure, and stenosis from the intralaryngeal development of the disease. Cicatrization occurs after

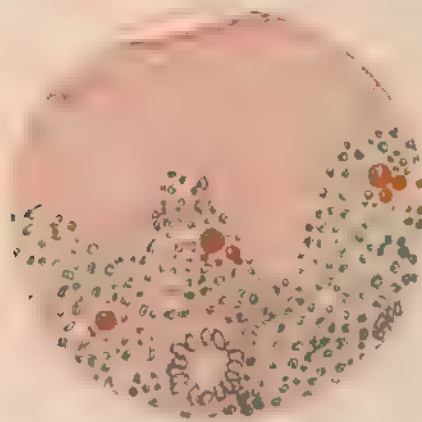


Fig. 123.—Lupus of the epiglottis ($\frac{1}{4}$ -inch objective; Ehrlich Biondi stain). (After Lennox Browne.)

destruction of tissue, and this may lead to laryngeal stricture. The epiglottis is usually the part first affected (Figs. 123 and 124).

Diagnosis.—A laryngeal examination will always be necessary for correct diagnosis. It needs to be distinguished from tuberculosis, syphilis, carcinoma, and leprosy. The surface is pale and slightly œdematous. Ulcerations form, but, unlike tuberculosis, they are followed by cicatrization and consequent distortion with marginal thickenings. Another peculiarity noted by Lennox Browne is that in lupus of the epiglottis the infiltrations are sometimes so heavy that they make that organ overhang and almost hide the inner larynx. There are no systemic symptoms as in tuberculosis or cancer, and there is no foul secretion as in syphilitic disease. In eastern countries it might be con-

founded with leprosy. It resembles it most in insensitiveness of tissue, but leprosy never occurs in the larynx alone. The absence of systemic symptoms should make the diagnosis comparatively certain.

Prognosis.—This in many instances is good, so far as temporary recovery is concerned. The progress of the disease is slow. Sometimes it may be arrested for awhile, and recur at a later date at the old cicatrix. It is not often dangerous to life, but, being a manifestation of the presence of tubercle bacilli, tuberculosis of the lungs may supervene to carry off the patient. In some instances the disease itself has been known to produce fatal stenosis.

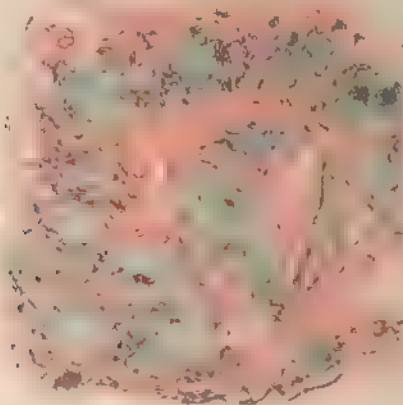


Fig 124 =Lupus of the epiglottis $\frac{1}{2}$ inch objective, Ehrlich-Biondi stain). (After Lennox Browne

Treatment.—This does not materially differ from that of laryngeal tuberculosis. Supporting measures to the system are required, though not so loudly called for as in the sister-disease. Curettage, owing to the hardness of the nodules, needs to be done more vigorously than in tuberculosis, but is followed by better results. Local treatment by applications of lactic acid, menthol, and creasote are of the highest importance. By the use of one or other of these or all in succession the disease may frequently be arrested, giving the patient months or even years of relief. When operation becomes necessary it is more hopeful than in tuberculous disease. Schroetter's bougies may dilate the stenosed larynx in some cases. Tracheotomy will always

afford relief when life is endangered from stenosis. When severe constriction occurs in the glottic region, intubation may be required, though some authorities claim that the irritation produced by the pressure of the tube will only accentuate the growth of the disease.

CHAPTER LXXVII.

LEPROSY OF THE AIR-PASSAGES

THE International Conference on Leprosy held in Berlin in October, 1897, gave to the general profession almost the first light they have had upon this obscure subject. Glück, of Sarajevo, made a report upon 37 cases affecting the air-passages, all taken from the one leprous district; Jeanselme and Laurens, of Paris, based their statement upon 26 cases of general leprosy, 60 per cent. of which had leprosy of the mouth, nose, or throat.

The disease always affects the mouth or nose before invading the pharynx or larynx. According to Glück's experience, the nasal cavity was affected in 90 per cent. of his cases, the larynx in 70 per cent., and the mouth and tongue in 50 per cent. In the large majority of instances the skin is attacked much earlier than the mucous membrane. In some cases, however, it is reported to have commenced within the nose.

One of the leading features of leprosy is to attack (1) the epidermal structures, and (2) the mucous membranes bordering upon them, the two surface epithelial coverings being always affected before the underlying tissues.

There are two varieties of leprosy: the nodular and the anæsthetic.

"The microscopical changes differ somewhat in the two varieties. Those of the nodular, or tuberculous class, commence as an accumulation of lymphocytes in the perivascular lymph-spaces, forming a network of infiltration-strands which, increasing in thickness, appear under a low power as solid cylinders invading and absorbing the intervening tissues. In section under high power these strands appear like nodules with giant cells, and if stained by the Ziehl-Neelsen or Gram's method are seen to contain bacilli.

"In the anæsthetic form bacilli are not easily demonstrated; they can, however, be seen in the inflammatory cell-tissue growing along the perineural lymph-spaces.

"The specific bacillus of leprosy, or Hansen's bacillus, has certain peculiarities which distinguish it from bacillus of tubercle. They are

from 5 to 6 microns in length and 0.35 to 0.50 micron in thickness. The rods are said by Babès to be interrupted by non-staining, clear spaces, representing doubtful spores. They are, as a rule, readily stained *in situ*, as may easily be demonstrated by the trituration method, aided by boiling and digesting." (Lennox Browne.)

LEPROSY IN THE NOSE.

The first symptoms are those of persistent coryza accompanied by formation of crusts. The discharges contain Hansen's bacillus, and are consequently contagious. This is the more dangerous in cases in which the nasal disease is primary, as the leper is consequently not immediately aware of the nature of the disease. Epistaxis is also an early symptom. The bridge of the nose becomes broader and the cuticle thicker, while the organ shortens in length, the anterior nares assuming an almost vertical plane. The disease is usually of the nodular type.

Soon the cartilaginous septum softens and gives way, the bridge drops, and the nose flattens with the rest of the visage, as in the case of septal destruction from tertiary syphilis.

In the early stages the mucous membrane is reddened, swollen, and liable to bleed when touched. In the later ones, brown crusts, erosions, and muco-pus are present. The destructive lesions are the whitish- or pinkish- gray, leprous nodules, contrasting forcibly with the deep red of the rest of the membrane. As the nodules become confluent, they may close up the nares, producing complete stenosis.

When septal perforations take place, it is by resorption and without sloughing or discharge. As the disease advances, pronounced anæsthesia occurs. The sense of smell is retained, although pallor and atrophy mark the climax of the disease.

Lupus and syphilis are the only diseases for which leprosy of the nose might be mistaken. Lupus nodules are firmer. In lupus, also, the nostrils may be eaten away, the septum remaining sufficiently intact to support the nose, and always being the last to succumb, while in leprosy it is almost the first to yield. Leprosy also has more anæsthesia during its progress, and, as the disease advances, invariably affects the cuticle to a greater extent than does the lupus. The two latter symptoms also distinguish this disease from syphilis, the general history of which, with its unilateral development in the nose, should be sufficient to render diagnosis certain.

LEPROSY OF THE MOUTH AND PHARYNX.

In these regions smooth patches are first formed, to be succeeded by prominent nodules. The median furrow of the tongue is said to be greatly exaggerated. Anæsthesia and infiltration of irregular patches take place, while the sense of taste, like the sense of smell, is usually retained. Morell Mackenzie, in tabulating the history of twenty-five cases, only reported dysphagia as present in one. It is fortunate that so terrible and loathsome a disease should entail so little physical suffering.

The pharynx is always more or less inflamed. Hypertrophy of the tonsils and other tissues soon follows, to be succeeded at a later stage by atrophy.

Hearing is also likely to be impaired, through extension of the disease to the Eustachian tubes.

The diagnosis from syphilis and lupus must be made on similar lines to those already referred to. From tuberculosis of the pharynx, which it somewhat resembles; the intense pain attending the former, with its characteristic high febrile action, should readily be distinguished from the anæsthesia and low temperature always found in the leprous throat.

LEPROSY OF THE LARYNX.

The first appearances of this disease in the larynx are usually in the form of little, gray, sensitive nodules on the posterior side of the epiglottis. At first, as they produce no irritation, they are unnoticed by the patient. Later on, as the disease spreads all over the epiglottis and to the arytenoids and aryepiglottic folds, forming a gray, hardened mass, respiration as well as vocalization may be interfered with. The interarytenoid commissure, at first appearing like a soft cushion, at a later period becomes crusted and hardened, a general pachydermia of the larynx having taken place. As the disease advances, it is usually impossible to examine with the laryngoscope the lower portions of the larynx, on account of the extensive thickening and fixation of the epiglottis itself (Fig. 125).

When this organ is eaten away, as in Mackenzie's case, the distorted intralarynx may sometimes be examined.

According to Bergengrün, the implication of the vocal cords does not come on until late in the disease, and sometimes not at all.

The experience of Lennox Browne, from whose book this chapter

is largely taken, bears out that of other observers, that the changes which first occur in the larynx are those of general thickening and less nodular than when found on the palate, and that the destruction of the natural tissues, as the disease advances, is always more of the nature of absorption than of ulceration.

While the functions of phonation, respiration, and deglutition



Fig. 125—Leprosy of the tongue and epiglottis
(From Lennox Browne, 1899.)

may be interfered with to a more or less extent, the patient suffers little, if any, pain in this disease. Structural changes, also, appear to affect the vocal cords last of all. The voice at first is but slightly altered. Then the higher tones may be broken, hoarseness and aphonia coming on at a later period in many cases.

Deglutition is sometimes difficult, but rarely painful.

Respiration is always interfered with to a more or less extent, and

when the vocal cords are affected may be very difficult, producing stenosis and necessitating tracheotomy to prolong the life of the patient. Dr. Abraham has reported a case in which the glottis was reduced to the size of a goose-quill. Death sometimes occurs from œdema of the glottis the result of the disease.

Treatment.—No treatment is curative. Palliation is all that can be accomplished. De la Sota reports beneficial results from applying resorcin and iodoform in ether. Hygienic and dietetic measures should be attended to. Lennox Browne suggests the advisability of trying serum-therapy.

CHAPTER LXXVIII.

SYPHILIS OF THE LARYNX.

PRIMARY syphilis of the larynx is so rare as to be almost unknown, and, as a secondary lesion, it is seldom met with. The chief manifestation of the disease is in the so-called tertiary period, occurring many years after the development of the primary lesion. Congenital syphilis of the larynx is a rare affection.

Pathology.—The pathological conditions produced by syphilis of



Fig 126 Destruction of epiglottis from syphilitic ulceration.
(From Bosworth)

the larynx are as variable as those found in the upper portion of the respiratory tract, with the exception of the extreme rarity of the primary stage.

In secondary syphilis there may be the deep congestion of the mucous membrane, accompanied by dryness. Following this may come infiltration, the swollen membrane quickly becoming the seat of numerous shallow ulcerations, resembling the mucous patches observed in the pharynx, but distributed with less regularity. These occur from six months to two years after the development of the primary sore in some other part of the body, and are only found in the vocal cords.

The ulcerations occurring in this stage are gray in color, surrounded by an hyperæmic red zone. Secondary syphilis rarely occurs in the larynx until several weeks or months after the appearance of the cutaneous eruption.

The tertiary stage is also marked by hyperæmia. This may be followed by deep and rapid ulceration, destroying cartilage and surrounding tissue. Efforts to repair by Nature produce severe contraction from cicatrization, impeding respiration and producing stenosis. The extensive destruction of the epiglottis and other cartilages of the larynx, arising from tertiary disease, may end in gross deformity as well (Fig. 126).

Gummy tumors are probably the most frequent pathological for-



Fig. 127—Cicatricial stenosis of larynx, the result of syphilitic ulceration. (From Bosworth.)

mation found in the larynx during the course of this disease. They do not occur, however, until years after the primary infection. The interval may be over one and even two decades, the larynx during all this long interval being practically free from disease. Sometimes the gummy tumor involving one of the vocal cords may break down by ulceration, with extensive destruction of the tissues. In others it may continue as a dark, nodular enlargement impeding the functions of deglutition and respiration. The process of cure after destruction of cartilage is aided by formation of connective tissue; but this rapidly contracts, resulting in the deformities of cicatrization already referred to (Fig. 127).

Etiology.—Syphilis of the larynx is usually a tertiary, sometimes

a secondary, manifestation of acquired disease. As a primary affection, the case reported by Moure, of Paris, in 1890, appears to be the only one on record. The cause may be hereditary as well as acquired. Syphilis of the larynx occurs more frequently in men than in women.

Symptomatology.—In secondary syphilis of the larynx the symptoms of the first stage resemble those of simple acute laryngitis. There will be soreness and hoarseness, and laryngoscopic examination will reveal the congested condition. Soon the rosy appearance becomes mottled. Certain parts assume a raised position and superficial ulceration follows. The voice changes early and the pitch is lowered. Odynophagia, as well as hacking cough with expectoration of muco-pus, is also usually present. When mucous patches are present they may be found most frequently upon the vocal cords, then upon the interarytenoid space, the ventricular bands, and the epiglottis. Condylomata sometimes occur in this stage. They are usually absorbed, and, like the ulcerations, are only of a few weeks' duration.

In the tertiary stage the deep ulcerations usually affect the epiglottis first, the oral surface on the edge being the first to suffer; next the intralaryngeal cavity and infraglottic region. It is during this stage that gummata are likely to develop. They consist of infiltration of the deeper layer of the laryngeal tissues, sometimes extending to the perichondrium. When the cartilages are affected the pain is more severe than when the gummatous deposit is confined to the epiglottic folds and ventricular bands. When the tumor develops within the respiratory tract, dyspnoea may follow as an effect of stenosis, while impairment of voice will result from the disease affecting the cords.

Apart from the stenosis produced by gummatous enlargement, it arises much more frequently from the vigorous cicatrization following the ulcerative process. Sometimes this is so severe as to threaten immediate suffocation. Not infrequently a cicatricial web forms, uniting the anterior ends of the vocal cords together; and, the slow chronic inflammation of the mucous membrane continuing, the lumen of the glottis may eventually be almost entirely closed. Pain in these cases is much less severe than would be expected, from the severity and extent of the diseased condition.

Diagnosis.—In the early stages it has to be distinguished from a simple catarrhal laryngitis. This, however, never extends to ulceration, and is easily removed by simple treatment, while the syphilitic lesion only yields to specific treatment. When the mucous patch has formed, it has the like distinguishing features of mucous patch in the

pharynx. The gummy tumor, as seen in the larynx, is a smooth, rounded tumefaction of hyperæmic appearance, and, unless destroyed by treatment or ulceration, likely to remain for some time. It is this manifestation of the disease which might be mistaken for tuberculosis or cancer. The diagnosis, however, is not always easily made. In tuberculosis the infiltration may be extensive as well as anæmic, instead of hyperæmic and circumscribed. In the one you have more local pain and febrile action, together with pulmonary lesion and emaciation. In the other these symptoms may all be absent, save the difficulty of deglutition and probable stenosis. From malignant disease it is distinguished by the history of the case, the absence of cancerous cachexia, exuberance of growth, and hæmorrhage should help to make the diagnosis certain. In all doubtful cases administration of antisyphilitic remedies should help to clear away the mystery.

Prognosis. Under proper treatment this should always be favorable, except in cases in which destructive action has already commenced. In even these it may be arrested. When, however, deep ulceration has followed the gummy deposit, cicatrization is bound to take place, the only hope being to promote absorption and arrest further ulceration.

Treatment.—The local treatment of secondary symptoms consists of frequent sprays of a mild, alkaline character, the main object being to keep the mucous membrane as free as possible from all irritating or foul secretions. If the ulcerations or mucous patches persist in development, a nitrate-of-silver pigment of 10 per cent., applied on a cotton-holder, will do good service, the parts having been previously deadened by a solution of cocaine. Iodoform or iodol in powder by insufflation, or weak solution of corrosive sublimate by atomizer, is also applied in these cases. Cleansing and disinfectant treatment of the larynx is always in order in tertiary as well as secondary disease.

The main reliance, however, must be placed on systemic treatment. In the earlier stages of syphilitic laryngitis mercurials are indicated, just as when it occurs in other parts of the body, while in tertiary disease the iodides are needed in full and regular doses. Sometimes a combination of the two is attended by the best results.

Surgical treatment is not required except in cases in which stricture has become so severe as to produce serious laryngeal stenosis. In these cases various methods of treatment may be called for. It is not often that membranous tissue can be removed without danger of inducing still more serious stricture. Still, in some cases adventitious

bands may be incised or snipped away. As a rule, when stenosis is severe, laryngeal dilators are called for. Of the many that have been used, Schroetter's, Navratil's, and Mackenzie's are among the best. The object in all is the gradual dilatation of the stricture, the instrument being passed into the larynx and retained as long as possible. The treatment should be repeated at intervals of a day or two and continued for months or until permanent advantage is secured.

Other means failing to produce the requisite amount of relief, intubation possesses, in some respects, a decided advantage over tracheotomy, inasmuch as it does away with any cutting operation. It can also be practiced by means of reflected light, and the tube worn or removed at pleasure. The chief disadvantage of a prolonged use of the



Fig. 128. Lennox Browne's hollow laryngeal dilator with cutting-blade ($\frac{1}{4}$ measurement)

instrument may be the defective deglutition which its insertion in a distorted larynx may produce.

Several years ago J. Mount Bleyer read an exceedingly interesting report to the American Medical Association, giving the history of the successful treatment of eight cases of syphilitic laryngeal stenosis. In all these he combined the use of Lennox Browne's cutting dilator with the after-insertion of O'Dwyer's tubes (Fig. 128). The throat is first sprayed with a 20-per-cent solution of cocaine. Then the cutting dilator is inserted, a large sized throat-mirror being used in order to give sufficient reflected light. For the moment breathing is interfered with, but the incision of the cicatrix is quickly made. Slight bleeding follows. A few minutes later a large-sized hard-rubber intubation-tube is introduced and worn for two weeks. It can be removed once or twice during that period, if required, for cleansing pur-

poses. In every instance there was greatly-improved breathing-space. The several margins of each cicatrix healed without union, leaving an almost normal chunk.

Bleyer closes his article with the following conclusions:

"1. In the first place, the destruction of the cicatricial web, by means of the knife, is preferable in every way to the older operation of simple dilation.

"2. It is a more radical procedure, and the obstructing tissue is destroyed quickly, instead of being pushed aside and thus allowed to slough.

"3. The operation saves time, a cure being effected with less chance of a recurrence of the difficulty, without increasing the risks of operation, than by means of simple dilation."

In some cases of syphilitic stenosis tracheotomy may be required.

CONGENITAL SYPHILIS OF THE LARYNX.

J. N. Mackenzie was among the first to draw attention to this exceedingly-rare manifestation of syphilitic disease. He says that "laryngeal lesions have not been found more frequently, simply because they have not been sought. Laryngeal disease is not rare in congenital syphilis. It is one of the most constant and characteristic of the pathological phenomena; and we may look for invasion of the larynx with as much confidence in the congenital as in the acquired form of the disease." Two-thirds of the cases so far reported have occurred during the first year. The younger the patient, the more rapidly fatal the malady. The chief symptoms are impairment of voice, catarrhal cough, embarrassed breathing, painful and difficult deglutition, frequent laryngismus, and general wasting cachexia. Frequently the only positive diagnosis can be made by antisyphilitic treatment by mercurials or iodides, or both combined. When adenoids block up the respiratory passages, they should be removed while systemic treatment is in progress. In some cases respiration may be so impeded that tracheotomy and even intubation may be required to relieve and possibly save the life of the little patient.

CHAPTER LXXIX.

NEUROSES OF THE LARYNX.

THIS subject may very well be divided into: "Neuroses of Sensation" and "Neuroses of Motion," the latter being subject to a further division: of "spasm" of the larynx, or overactivity, and "paralysis" of the larynx, or diminished activity.

NEUROSES OF SENSATION.

Various conditions of the larynx—such as anæsthesia, hyperæsthesia, paræsthesia, and neuralgia—may be grouped together under this head. They all indicate departure from the normal, the form of development being the result of personal tendency in each individual case.

There is no special pathological condition indicated; hyperæmia may or may not be present, but there is usually a neurotic condition of the system.

The causes which give rise to these conditions are numerous. Excessive smoking, alcoholic indulgence, unsanitary conditions, inordinate use of the voice, and hypertrophic conditions of the nose or naso-pharynx may be mentioned as the most common. Of neuralgia, a rheumatic or uric-acid diathesis is a frequent cause.

The symptoms are those of laryngeal irritation of one form or another, often accompanied by dryness of the throat and a tendency to cough. Anæsthesia may be an exception to this rule, inasmuch as laryngeal accumulations occur almost to the extent of obstruction without their presence being noticed by the patient.

Treatment.—Except in the latter instance, this should be of a palliative character. Anything that will soothe the irritable larynx, without injury to the general system, will be of benefit. Tablets of chlorate of potassa or muriate of ammonia dissolved in the mouth are often useful. Menthol lozenges containing $\frac{1}{4}$ to $\frac{1}{2}$ per cent. of menthol are likewise soothing to the irritated parts.

In the anæsthetic larynx stimulating the laryngeal nerves by electricity may be of benefit, together with the administration of strychnine, arsenic, or phosphide of zinc.

In the neuralgic larynx the cause should be investigated and removed. Treatment by the galvanic current, the intralaryngeal electrode being used, is sometimes beneficial in these cases. In rheumatic or uric-acid cases the salicylates may be of advantage.

NERVOUS APHONIA.

Nervous, or hysterical, aphonia is a functional affection of the adductor muscles, giving rise, for the time being, to complete loss of voice. In it there is no pathological lesion. The vocal cords are still controlled by muscles and nerves, anatomically and physiologically in a normal state, but, owing to the hysterical condition of the patient, the psychical power of co-ordination is lost, and no amount of effort on the part of the patient can produce the natural voice.

It seems to be a functional bilateral paresis of the lateral crico-arytenoid and the thyroarytenoid muscles: the adductors of the larynx. It is a disease peculiar to women of nervous temperament, and is one of the not infrequent manifestations of a highly-hysterical condition. While it lasts, the voice is reduced to a whisper.

Symptomatology. The attack is always sudden. From perfect vocalization, the change to complete aphonia may be instantaneous. At the same time the power of audible laughing or coughing, being to a large degree involuntary, may be retained. The paroxysm may cease as suddenly as it commenced. To persons subject to the attack, exposure to cold may induce a paroxysm. So may fright or intense nervous excitement.

Laryngeal examination will reveal the true condition of the vocal cords. Although otherwise healthy and normal in appearance, they cannot be evenly and completely adducted, often exhibiting a tremulous outline.

The prognosis in these cases is favorable, though even after cure a temporary return at any time is possible.

Treatment.—Mental impression will sometimes restore the voice. The introduction of a throat-mirror or the spraying of the larynx with a stimulating solution may either of them so dislodge the aphonic impression as to restore the power of speech. In other cases prolonged treatment may be required. Cleansing and stimulating sprays to the throat, application of the electric current, toning the system by the administration of strychnine or valerianate of zinc, sustaining diet, and change of air and scene may all be required before a successful result can be accomplished.

NEUROSES OF MOTION.

SPASM OF THE GLOTTIS

As Sir Morell Mackenzie remarked, it is important to bear in mind that this is not in itself a disease, but a symptom of disease, its usual manifestation being in the form of spasm of the glottis, or laryngismus stridulus. The nature of this affection is variously estimated by different authors. Many believe that it is of reflex nervous origin, resulting in spasmodic contraction of the adductors of the vocal cords, the difficult breathing and barking cough being the result of the consequent stenosis.

I am afraid we have not got much beyond Marshall Hall's teaching of sixty years ago, that it was always produced by reflex action from some region remote from the larynx itself. According to this view, it originates "in the trifacial in teething, in the pneumogastric in improperly-fed children, and in the spinal nerves in constipation, intestinal disorder, or catharsis." Some believe that the pathological lesion is disturbance within the cerebral nerve-centres. Hughlings-Jackson has pointed out that the nerve-centres may not be knit so closely together as in the adult, and that a partial convulsion, such as occurs in laryngismus, points to the imperfect union of the different sections of the nervous system. The carpopedal contractions in children are explained in the same way. The nerve-centres not being fully developed, spasms of muscles or of groups of muscles, and even general convulsions, occur more readily and frequently than they do in adults.

Etiology.—This is a disease essentially pertaining to child-life. It usually occurs between the ages of three months and three years. About twice as many boys are affected as girls.

Physical organization, which is frequently a result of social condition, has a decided influence as an etiological factor. Ill-nourished children, living on poor food and in ill-ventilated houses, are particularly liable to contract it. In the densely-populated centres of large cities it is more prevalent than in other regions. When bad hygienic conditions and insufficient nourishment are constant, the offspring of the people have a tendency to rachitic disease. As a result a large proportion of the children who have spasmodic croup are likewise victims of rickets.

Symptomatology.—The first attack of spasm or closure of the glottis usually occurs at night-time. The child is taken with sudden convulsive action of the adductors of the glottis. For the time being,

respiration is arrested, more or less completely. The hands and feet are clenched, the head thrown back, and, if long continued, the face may become cyanotic. In a few seconds, or minutes at the longest, the adductor muscles of the larynx yield, the abductors come again into action, and respiration returns, sometimes gradually, with long, crowing breathing, and sometimes suddenly.

These attacks vary in duration and also in frequency. When the spasm is purely neurotic, relief may be complete for a time, occurring again at irregular intervals of hours or days. When the stridulous breathing arises from subglottic inflammation, the stenosis will be less complete, and at the same time more prolonged, never leaving entirely until the inflammatory cause is removed.

Laryngeal spasm, although rarely so, is sometimes fatal. C. H. Hunter (*British Medical Journal*, April, 1898) gives the history of two remarkable cases. These occurred in brother and sister. Both were perfectly well up to a few minutes before death, and they died within two days of each other. The mother took the boy, aged 19 months, up to wash him. In a fit of passion he threw his head back and became livid and rigid. He was put in a hot bath at once, but it was of no avail. Two days later the sister, aged 7 months, suddenly became rigid and blue in the face, and died like her brother, without uttering a sound. In both there were well marked carpopedal contractions, but no general convulsions. Post-mortem examinations were held, but all the organs were found healthy. There were no laryngeal obstructions, but in both were indications of rickets. Frederic Taylor says that rickets occur in 75 per cent. of all cases of laryngismus stridulus.

Diagnosis. When the spasm is purely neurotic, the diagnosis is not difficult, as the exacerbations are, as a rule, followed by perfect relief. There is no febrile action and no change in voice.

Paralysis of the abductors might produce similar crowing symptoms, but in this case there would be no exacerbations. Stenosis would be continuous without fever and without vocal change. From the stenosis produced by the presence of laryngeal papillomata, the general history, together with laryngeal examination, would render the diagnosis plain.

Prognosis.—Like the croupy symptoms arising from subglottic inflammation, this is usually favorable. A large majority of cases get well. When the spasmodic action of the adductors is complete, as well as prolonged, the result may be at once fatal, as in the cases referred

to. This rarely occurs. The spasms, although repeated several times, usually disappear even without treatment. The friends of the little patient, however, become alarmed, medical advice is obtained, and the cure hastened.

Treatment.—For pure nervous spasm of the glottis, immediate inhalation of a few drops of amyl-nitrate or chloroform may be tried. Of course, this would have no effect if the glottis were completely closed. A quick slap on the back, dashing cold water in the face, plunging the little patient into a hot bath, may all be tried. Hypodermic injection of minute doses of apomorphia, a milligramme for a child of three years, may also produce diaphoresis and vomiting.

As, however, the spasmodic closure of the larynx is only a symptom of central or peripheral disturbance of the nervous system, mere treatment of this symptom should not suffice. An attempt should be made to ascertain the real seat of the evil, and, by removing it, prevent the recurrence of the attack.

Eustace Smith in the *London Lancet* for March 19, 1898, gives the history of a case of constant laryngeal stridor in an infant, caused by the presence of adenoid vegetations. From the age of one month to four months the stridor had been constant day and night. Much of this time was spent in the hospital, but no relief from the continued croaking breathing could be obtained. Then the adenoids, which were not large, were removed. At once the night attacks of acute dyspnoea, which for three months had constantly occurred, ceased, and the child slept undisturbed. In a fortnight the croaking during the day-time could not be heard in ordinary breathing, and in a few more days the child was discharged cured. The history of this case is given as a rare and peculiar instance of constant reflex spasm of the glottis.

Spasm of the larynx not infrequently occurs in adults. It is usually produced by direct irritation of some portion of the lining membrane of the larynx itself. The entrance of some slight portion of food, drink, or any foreign substance will induce an attack. On two occasions I have seen severe laryngeal spasm occur in elderly men from separation of a drop of fluid from a cotton-holder, while it was being passed into the naso-pharynx. The drop in each case fell directly into the open larynx, and by reflex action produced, for a great many seconds, complete closure of the glottis. I mention this from my own practice as much in the way of warning as anything else. Whenever application is made through the oral cavity into the naso-pharynx, all redundant moisture should be pressed out of the pledget before attempting its insertion.

PARALYSIS OF THE LARYNX.

Up to recent years it was believed that the abductor or adductor muscles might either of them be affected from lesion of the nerve-supply, to the exclusion of the opposite group. Also, that, in other cases, the central lesion might be so general as to affect all the motor nerves of the larynx, inducing paresis of both abductors and adductors at the same time.

Since that period opinions, based upon extensive clinical research, have undergone a material change. Now it is known that, in paralysis of the larynx, the abductor muscle, the posterior cricoarytenoid, is always the one first affected and that the term paralysis of the larynx, as usually applied, signifies paralysis of one or both of the abductor muscles. Further, when paralysis of the adductor does occur, it is always secondary to primary paralysis of the abductor, except in cases where the lesion is complete at once, as in section of the recurrent nerve.

Sir Felix Semon summarizes this conclusion as follows: "While there is not a single authenticated case on record in which it has been shown by post-mortem examination that in a slowly-progressive or game lesion of the motor nerves of the larynx the adductors had been primarily or exclusively affected, we are now in possession of quite a number of well-observed cases demonstrating the opposite order of events." That is, in which the abductors had been primarily or exclusively affected.

Semon adduces another curious fact, that, although in general paralysis of the larynx the abductors are always affected first, when recovery occurs the adductors lead the way. The reason assigned is that, from some cause still unknown, the abductors are much more vulnerable to nervous influence than the adductors.

The recent physiological investigations of Risien Russel have proved that, while the recurrent laryngeal nerve is the motor nerve *par excellence* of the larynx, it can be split for its entire length into three different bundles of fibres, one of which supplies the abductors, another the adductors, while the third is without motor influence. The fibres which supply the abductors of the vocal cords, being situated on the inner side of the nerve, are thus completely differentiated from those supplying the adductor muscles.

In the large majority of instances paralysis of the vocal cords is at first unilateral, and from its pathological condition would produce

no symptoms which would be likely to lead to immediate discovery. Nothing short of laryngological examination could make positive its existence.

In the first stage of paralysis the cord, which at rest would be in the cadaveric position, leaving abundance of room for respiration, would be drawn to the mesial line by the adductors in phonation. Later on, if the adductor muscle remained unaffected, this constant tension, unopposed by the abductor, would lead to permanent retention of the affected cord in the mesial line. Vocalization would still be perfect, while respiration would only be slightly affected, the opening made in the glottis, by the unaffected abductor of the opposite side, still being sufficient for breathing purposes.

When paralysis of the abductor is followed by extension of the lesion to the adductor muscles, the cadaveric position on that side becomes permanent. This, of course, would leave the breathing space unaffected, and would affect the voice but little, as the unaffected cord during phonation would sweep across the mesial line, to adjust itself to its paralyzed fellow. Hence, even in this extreme case, ordinary symptoms would not indicate the true condition of the vocal cords.

In cases where the paralysis is bilateral, but in the primary stage, affecting only the posterior cricoarytenoid or abductor muscles, vocalization will still be little interfered with, as the cords are adducted to the position required for the production of sound. Respiration, however, is seriously obstructed. The breathing is labored, even to the extent of impending suffocation. When to this is added adductor paralysis, the breathing may be somewhat easier, as both cords are unmovably fixed in the cadaveric position; but with the change the voice is completely lost.

Laryngoscopic examination should in all cases be made when there is reason to suspect the presence of paralysis; and by it the extent of loss of power should be at once ascertained, if any really exists.

The causes of paralysis are numerous. In bilateral, the lesion is usually central and may arise from the presence of gummata, sclerosis, tumors, progressive bulbar paralysis, effusions at the nerve-origin, etc. Diphtheria is not infrequently the cause.

In unilateral paralysis the cause is more frequently pressure upon some part of the course of the nerve itself, as from aneurism of the arch of the aorta, hypertrophied glands in malignant disease, tuberculosis, etc.

The prognosis in paralysis of the larynx, whether unilateral or bilateral, is not usually favorable. As a rule, it is but an indication of the presence of some central or peripheral lesion that is itself incurable. When the paralysis is but the sequel of diphtheria or one of the other exanthematous diseases, the outlook is more hopeful; also when arising from the presence of gummata.

Treatment. When arising from pressure upon the recurrent laryngeal nerve, the removal of the pressure either by excision of tumor or absorption of gummatous deposit should restore to the posterior cricoarytenoid its normal nervous supply. For the latter iodide of potassa should be freely given. In diphtheritic cases strychnia in sustained doses will have a good effect, and, in both, electrical treatment should aid in restoration of muscular power. The faradic current to the interior of the larynx, anesthetized by cocaine, will be followed by good results in many cases of functional origin, the negative pole being applied to the paralyzed muscles within the larynx, by aid of the laryngoscope, and the positive pole with a large flat electrode to the external larynx.

Systemic means to restore the general health are also required in these cases.

For aneurismal and tubercular cases, as well as those arising from central lesions, little can be done save of a general character for recuperative treatment.

George F. Ross, of Montreal, has recently reported a case of bilateral, abductor, laryngeal paralysis in a man, aged 50, arising from chronic alcoholism of long standing. The treatment consisted of full diet, together with sedatives and tonics. The local treatment was by galvanism and faradism. The result was very satisfactory, as the chink widened materially under treatment, freeing the patient from his suffocative attacks.

CHAPTER LXXX

NON MALIGNANT TUMORS OF THE LARYNX.

SPECIMENS of nearly all the varieties of benign tumors have been found within the larynx. The majority of these, however, are exceedingly rare. Papillomata are the most frequent in occurrence, with fibromata probably as second, while cases of cystoma, myxoma, lipoma, enchondroma, and angioma are among the rarest of laryngeal affections. Pathologically these various neoplasms are the same as when found in the nose or naso-pharynx, the difference in condition being one of site, and not of history.

Papillomata may occur at any period of life. They occur most



Fig 129 Papilloma of cord during respiration.



Fig 130 Same during phonation.

Patient male, aged 55. Entirely removed by local application of astringents. Under treatment one year. No recurrence. (Author's case)

frequently during childhood and mature years. Their site is usually the vocal cords, and they may be single or multiple. They differ in color also, from pink or light red to gray. In early life they are ordinarily of a bright reddish color, and may exist in large numbers. Although usually sessile, with a warty appearance, they are sometimes pedunculated. In adult life they often occur singly, being attached to the margin of one of the vocal cords (Figs. 129 and 130).

In childhood recurrence after removal is frequent, while in adult life it is rare.

Fibromata, although occurring with much less frequency than papillomata, are also usually attached to the vocal cords. They never

occur in childhood. They are hard in texture, gray or deep red in color, and may be attached either by a broad pedicle or a wide, sessile base. After complete removal they seldom recur (Fig. 131).

Of the other varieties of benign tumors, the cystoma, while exceedingly rare, occurs with equal frequency upon the epiglottis and the vocal cords. In Charles Knight's case it occurred in a colored man aged 40 years. The cyst was pale in color, with a number of large blood-vessels on its surface. It was round in form, about the size of a hickory-nut, and attached to the left side of the epiglottis. The tumor was readily removed by means of a cold wire snare without hæmorrhage and without pain, the throat having been previously sprayed with a 10-per-cent solution of cocaine. Myxoma or polypus when present usually appears on the cord, and the same may be said of angioma. Enchondroma has been observed on a number of occa-



Fig. 131. Fibroma situated beneath the right vocal cord, occurring in a man, age 40, and removed by frequent applications of galvanocautery point after brushing each time with 15 per cent solution of cocaine (Author's case.)

sions (Fig. 132). The usual site has been the inner aspect of the cricoid cartilage. The growth is sessile and hard, infringing by its continued development upon the breathing space. Lipoma has its favorite seat upon the aryepiglottic folds. As it enlarges, it falls over into the hyoid fossa or œsophagus, and, attaining great size, threatens suffocation of the patient. Angioma also sometimes occurs (Fig. 133).

Symptomatology.—None of these growths are likely to be attended by much pain. The main symptoms are those arising from obstruction of respiration and phonation. In certain cases deglutition may be affected, but only when the growth within the larynx is large, or else, as in lipoma, when the œsophagus or hyoid is intruded upon. Cough is also present in many of the cases.

In papillomatous disease the voice is usually severely affected, as the neoplasm is located on the margin of the cord. When the papillo-

mata are numerous, the voice may be completely aphonic and the respiration interfered with.

When the growth is situated entirely free from the vocal cords, the voice may not be impaired, although the obstructing neoplasm may be large enough to produce dyspnoea.

Diagnosis. - This will depend almost entirely upon laryngoscopic examination, which should reveal the size, color, and location of the growth. When the diagnosis is still uncertain, a small piece should be snipped off the neoplasm to be submitted to histological examination.

The main distinctive features which the laryngoscope reveals are

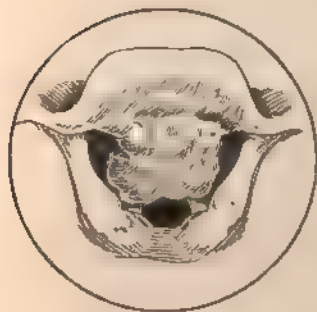


Fig. 132 Chondroma of the epiglottis. (After Bosworth.)



Fig. 133 Angioma of the left aryepiglottic fold. (After Bosworth.)

as follow: A papilloma is soft and movable by inspiration and expiration. When single, it is a gray or pink, and, as a rule, situated upon the anterior half of the vocal cord. It is usually sessile, although the base is not very broad. When multiple, as in children, the little, soft masses may have a brighter hue, and the whole length of the cords may be studded with them. I have seen the latter condition in a girl of eighteen years.

A fibroma appears as a hard, rounded mass in some cases, it is multilobular in form in others. It is usually sessile and may vary in size from a grain of wheat to a couple of centimetres in diameter. The mucous membrane covering it is richly supplied with vessels, which heightens the color of the tumor.

A chondroma, as said before, lies, in the majority of cases, below the vocal cords. It also is round, resisting, and nodulated, but is lighter in color than either papilloma or fibroma. From its color and appearance it might possibly be mistaken for carcinoma, but for its occurrence in early life, while malignant disease of the larynx occurs only in later years.

A cystoma usually presents itself as a pedunculated cyst, compressible and soft, and of a pinkish-gray color.

Angioma has a red and strawberry-like surface, while myxoma looks like a nasal polypus transferred to the laryngeal cavity, but tinged with a higher shade of color.

Prognosis. Non-malignant tumors involve little danger to life, except when they assume such proportions as to threaten suffocation. In children papillomata are sometimes produced in alarming numbers. One unfortunate feature of their development is that after removal they have a strong tendency to reproduction. In adults they can usually be removed, and, if the vocal cords remain uninjured, the voice, when affected, soon regains its normal tone.

Treatment.—Many instruments have been devised for operation upon these benign neoplasms when necessary, but they are all intended to be used intralaryngeally. A good laryngoscope view of the larynx having been obtained, the instrument and method must be chosen to suit the case in hand, care being taken to avoid all undue injury to the healthy soft parts surrounding the diseased tissue.

In papillomata after free cocaineization astringent and stimulating sprays have sometimes been found beneficial, particularly in the multiple variety. Of these, perhaps, pure alcohol has the highest reputation. Touching the single growths with fluid extract of *Thuja occidentalis*, 20-per-cent. solution of tannic acid, 5- to 10-per-cent. solution of nitrate of silver, 2- to 5-per-cent. solution of sulphate of copper, or 2 to 5-per-cent. solution of chloride of zinc might be mentioned, and, as a caustic, chromic acid melted on the end of the applicator is advocated by some writers.

To eradicate the growths, however, more effectual measures are required. Before operating a 20-per-cent. solution of cocaine should be freely applied to the inner larynx. Cutting forceps (Fig. 134) of different kinds to suit each case, for the removal of papillomata and fibromata, are the most favored instruments. When the growth is distinctly pedunculated, the snare carefully adjusted is probably even more effective, care being taken to sever the attachment by the wire

before too much traction is made. Very small sized papillomata may be extracted by the use of Schroetter's tube-forceps; but, for larger growths, Tobold's, Fauvel's, or Mackenzie's forceps are preferred.

For cystoma, evacuation by the knife, and subsequent local treatment by tincture of iodine or nitrate of silver, are advisable.

For enchondroma the galvanocautery has been used, as it is also in some cases of fibroma. Myxomata may be snared or picked off by laryngeal forceps, and subsequently the site of attachment touched by

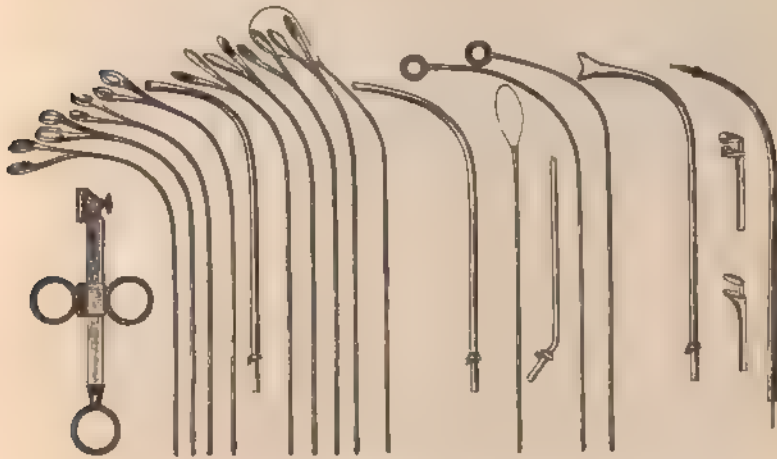


Fig. 134.—Extirpation instruments, Krause's set of 19, in universal handle.

the galvanocautery. Angioma also might be treated with the same instrument at a dull-red heat.

Each individual case should be given the most careful consideration by the operator; and be treated, not according to rule, but by the light of experience and upon its own merits. It should ever be remembered that some of these benign growths, if left to themselves, will eventually disappear or at all events become innocuous, particularly in cases where the free use of the voice is not of vital importance. There is also the possibility of stimulating reproduction of the neoplasm by operative treatment; and, still further, of inducing the development of malignant disease by officious operative interference. This, at all events, is the view of many able writers, among whom Lennox Browne

stands prominently forward. Not that these operations should be eschewed altogether, but that a wise judgment should be exercised always in dealing individually with these cases.

In multiple papillomata of children treatment by tracheotomy has recently been received with favor. Railton, in the *British Medical Journal*, February, 1898, gives the history of two little girls aged, respectively, 3 and 4 years, treated successfully in this way. One required to wear the tube forty-five months before the growths were all absorbed; the other for twenty-five months. In each the child made a good recovery eventually, without return of the papillomata. At first silver tubes were worn, then soft-rubber ones. The latter were renewed three times a week. Railton attributes the spontaneous atrophy of the growths to the removal of the irritation of respiration and coughing. Of course, the period of cure was prolonged, but it must be remembered that, in cases where laryngotomy has been performed to facilitate removal, the growths have subsequently in many instances recurred.

In some cases it is possible that prolonged intubation might have the effect of promoting absorption by the constant pressure it produced. Still, the difficulty of deglutition would be a hindrance. Prolonged wearing of laryngeal tubes of any kind has also the possibility of inducing granulations and polypoid growths to form round the margins of the instrument.

Thyrotomy has frequently been performed for this class of cases in children, but the results have never been brilliant.

G. Hunter Mackenzie (*British Medical Journal*, May, 1899), in his remarks on laryngeal growths in young children, advocates tracheotomy as the treatment, of all others, most satisfactory in this condition. He lays it down as an axiom, that the two methods, so frequently advocated, removal *per via naturalis* and by thyrotomy,—are both inadmissible, the reason given being that direct interference with, or irritation of, the growths is almost always followed by rapid recurrence. The endolaryngeal method of removal involves a prolonged series of operations, which are usually followed by recurrences, while thyrotomy, when tried, has sometimes required to be repeated three or four times within a year, resulting in more or less permanent impairment of the voice, as well as stenosis of the larynx.

Intubation is objectionable in these cases on account of the irritation it produces. It is also frequently difficult to retain the tube in position.

The point that Hunter Mackenzie insists upon is that tracheotomy in this disease is not only a palliative, but also a curative, operation.

The order of events he describes as follows: First, the breathing is relieved. Second, the growths, being freed from the irritation of coughing and phonation, gradually lose their vitality and become detached from the vocal cords, without any tendency to recur. If the expectoration and secretion from the windpipe, as taken from the throat of the patient or from the tracheal wound when cleansing the tube, be examined, the growths will be found to come away in pieces. Gradually, in periods varying from one month to six months or a year, the papillomata shrivel away and finally disappear.

The tube should not be permanently removed until the growths are all away. This removal of the tracheotomy-tube is always objected to by the child, as at first normal breathing is more difficult than the artificial. Consequently, one or two short reinsertions may be necessary. In a short time, however, breathing becomes natural and the voice is gradually restored.

CHAPTER LXXXI.

MALIGNANT TUMORS OF THE LARYNX.

OF these, there are two varieties: carcinoma and sarcoma. The latter is rarer, occurring in about one-third of the cases. The growth of sarcoma is the more rapid of the two, and it may occur earlier in



Fig. 135 Sarcoma of the larynx, as seen from behind
(After Lennox Browne)

life, while the general symptoms and history resemble those of carcinoma, with the exception that it develops less systemic cachexia and less involvement of the cervical glands (Fig. 135).

Histological examination alone can make the diagnosis positive between the two, and the prognosis in each case is equally unfavorable.

Carcinoma of the larynx, although it occurs more frequently than

in the nose, naso-pharynx, and pharynx combined, was, according to Gurlt, only found 63 times in 11,131 cases of carcinoma, or 1 in 176, showing that its frequency is comparatively small, in comparison with its occurrence in other organs of the body.

Pathology. The histology of these two diseases is the same as when found in other regions.

In the larynx the variety, in a large majority of instances, is epithelioma. The most frequent site is the ventricular bands, probably one-half the cases occurring in this region, the other half being found, without any precise order, upon the vocal cords, epiglottis, commissure, aryepiglottic folds, etc. The variety of cancer formerly found in the larynx and called "encephaloid" would now answer to the title "small-celled sarcoma"; while the "scirrhous" of the larynx which history speaks of would agree with our present dense, "spindle-celled sarcoma" (Lennox Browne). Besides these, two other varieties—chondrosarcoma and myxosarcoma—are both sometimes, though rarely, present.

Of epithelial cancer two types are met with in the larynx: the squamous and the alveolar. The first is what is called the nested variety, the epithelial elements forming solid cylinders in the subjacent tissue. The second, or alveolar, variety is very rare. Its name implies its character, and it originates in gland-tissue, while the squamous develops in stratified epithelium.

Primary carcinoma, while confined to the inner cavity of the larynx, shows little tendency to involve the glands of the neck. This well-known fact only relates to cancer well within the larynx, -for instance, the ventricular bands and vocal cords, and does not apply to the disease occurring on the epiglottis, aryepiglottic folds, or arytenoids. When the cancer is located in these regions the surrounding glands are quickly affected.

As Bosworth has already shown, Sappy's anatomical investigations of the lymphatic supply to the larynx would seem to give the reason. While the epiglottis and the aryepiglottic folds are richly supplied with lymphatic vessels, these become attenuated toward the ventricular bands and vocal cords, the supply of lymph to these being very limited, the attenuation increasing with years. Consequently cancer of the inner larynx has less power of communicating itself to the gland-elements than when it occurs in the more richly-supplied region above.

Symptomatology.—The early symptoms of carcinoma and sarcoma do not differ widely from those attending the formation of non-

malignant growths. The effect upon the voice will depend upon the situation of the tumor. So long as the vocal cords are unaffected, and can close in phonation, the voice may be clear; but in intrinsic cancer it soon becomes involved, either by direct extension of disease to the cords themselves or by obstruction to adduction from the presence of the growth.

As infiltration extends, dyspnoea follows, likewise glandular enlargement. A few months from the commencement of the disease ulceration begins, to be followed, in many instances, by hæmorrhage and marked cancerous cachexia. The breath becomes fetid and the discharge foul and abundant, accompanied by more or less salivation.

Pain, too, is almost invariably present, often in an increasing ratio, shooting up to the ears, and across the pharynx. Deglutition, too, becomes painful and difficult.

Diagnosis.—To accomplish this at as early a date as possible is imperative. Laryngoscopic examination is essential in all cases to diagnosis. By the use of the throat mirror the growth can be seen, thickened, nodular, and hyperæmic in the early stages, ulcerated and covered with fungoid growths later on. The larynx becomes distorted and filled with foul and fetid secretions, which are of themselves of diagnostic importance.

By optical examination alone a diagnosis between sarcoma and carcinoma cannot positively be made. Probably in carcinoma there may be more ulceration, and at the same time less rapid growth than sarcoma, but these are only matters of degree, and upon microscopical examination the diagnosis really depends. Possibly, of the two, sarcoma may be the less painful.

Prognosis.—Wherever it may be located, cancer is one of the most painful as well as most fatal of diseases. Its occurrence in the larynx is no exception to the general rule. Without operation there is no hope whatever of recovery. With operation, although the mortality is still very large, cases have been known to live for years without any return of the disease. The improvement in technique which is now practiced by the skillful operator gives the patient still more reason for hope; and the percentage of recoveries, after laryngectomy has been performed, is larger at the present time than ever before in the history of this distressing malady, although still it is small.

Treatment. The question of relief in all cases is an important one. Unfortunately it is the most we can expect to accomplish in the majority of cases. Life may be prolonged and made more comfortable,

and relief from pain itself, which is often agonizing, should always be given if at all possible.

After washing out the throat with a cleansing spray, the pain may be relieved by throwing in a weak solution of cocaine. This may be followed in like manner by a spray of $\frac{1}{2}$ - or $\frac{1}{3}$ -per-cent solution of permanganate of potash. Some authorities prefer the insufflation of powdered iodol, aristol, or iodoform. Any of these should diminish the amount of pharyngo-laryngeal sepsis and lessen the discharge. The menthol, thymol, and camphor-menthol solutions already alluded to have the additional effect of cooling the inflamed larynx.

To control the laryngeal pain, which is often present in an increasing ratio as the disease advances, cocaine is probably the best remedy. It can be commenced by fine atomization of a 1- or 2-per-cent solution, thrown into the throat, gradually increasing the percentage of the cocaine as the requirements of the case may demand. When he knows that the issue will inevitably be fatal, it would seem to be the surgeon's duty to render the euthanasia as free from pain and as comfortable as circumstances will allow.

While intubation, from the nature of the disease, would be wholly useless, tracheotomy, by preventing impending suffocation, will sometimes be of the greatest service, lengthening out the life of the patient at least for months.

Removal of malignant growth by endolaryngeal operation has frequently been attempted. So far the reports have, on the whole, been exceedingly unsatisfactory. The nearest to a perfect cure that I have so far seen reported is one by Jurasz, of Herdelberg. It appeared in the *Journal of Laryngology*, October, 1898. In December, 1897, he removed from a woman, aged 44, under local anaesthesia the right vocal cord from the anterior commissure to the processus vocalis; also parts of the left vocal cord and anterior commissure at a different sitting. All were proved by microscopical examination to be affected with epithelioma. The instrument used was one specially devised for the purpose. At the time of writing, ten months later, there had been no return, cicatricial membranes had formed in the place of the vocal cords, and the patient could speak with a hoarse voice.

Jurasz is of the opinion that localized cancer of the inner larynx can be removed as thoroughly by endolaryngeal operation as by laryngectomy. This opinion, however, appears to be based upon the one successful operation.

When the cancer had been confined to the inner larynx, and has

consequently been free from glandular complication, laryngectomy has, in a number of instances, been successful. Perhaps the most remarkable case, as it was the first of its kind, was the one operated on early in 1892 by J. Solis-Cohen. It was a case of epithelioma of the larynx in a man about 40. The entire larynx was removed, and the severed trachea was stitched to the skin, thus shutting off entirely the respiratory passage from the mouth. After recovery the man was able to articulate in a loud whisper. It was supposed that the air taken into the pharynx filled a sort of pouch in the lower part of it, and then by muscular contraction was forced through the tightened faucal muscles in imitation of the vocal cords. Five years later this man traveled over America and Europe, exhibiting himself before the various medical societies. There had been no return whatever of the malignant disease.

The Solis-Cohen operation has been performed a number of times since then. The last case recorded is by Depage in *Société Belge de Chirurgie*, January, 1898. The operation was performed eight months previously. All communication between the lungs and mouth was cut off, the trachea being attached, as in Solis-Cohen's case, to the skin. He can speak in a whisper and there is no recurrence.

Indications are beginning to show that the future of patients suffering from this disease, when confined to the inner larynx, is not quite so dark as was until recently believed. Bryson Delavan, in a recent issue of the *Therapeutic Gazette*, speaks squarely upon this matter. He believes the subject should receive the most careful consideration. Three groups of operations are offered: Thyrotomy with or without partial laryngectomy; complete laryngectomy by the Solis-Cohen operation; and complete laryngectomy in cases of extensive laryngeal disease with glandular involvement.

Delavan also lays down rules for guidance in selecting cases for operation:—

1. Every malignant growth of the larynx of intrinsic origin, which can be dealt with, should be treated by an operation in the absence of a decided indication to the contrary; and the operation should be performed with the least possible delay.

2. Every tumor of the larynx suspected to be malignant, of intrinsic origin, of limited extent, and apparently within reach of free removal justifies an exploratory thyrotomy in a suitable patient, in the absence of infiltration of the surrounding structures and of affection of the lymphatic glands.

3. The method of operating as pursued by Butlin and Semon is recommended.

In the case operated upon by J. Solis-Cohen the severed end of the trachea was brought to the external edges of the vertical incision and there retained, thus cutting off communication between the pharynx and the lungs. The advantages of this procedure are very evident: the danger from inspiration pneumonia is greatly lessened, swallowing is easily accomplished, the power of phonation can be acquired (as shown in the cases operated on in this manner), and the patient's comfort is greatly increased, as the wearing of an artificial larynx is not necessary.

Several years ago a method of treatment of cancer was devised by Coley which seemed to be efficacious in certain cases of one class of the malignant disease, namely: sarcoma. This was by inoculations of erysipelas in a patient suffering from inoperable sarcoma. The malignant tumor would partially shrink away, and remain without regrowth for a prolonged period. As little has been heard, however, of the further advance of this method since Coley's report was first issued, it is doubtful whether the results have realized the expectations of the writer.

Middlemas Hunt, in the *Journal of Laryngology, Rhinology, and Otology* for October, 1898, reports an exceedingly interesting case of successful operation for the removal of intrinsic cancer, the chief interest being in the great age of the patient, which was 80 years. On examination the anterior part of the glottis was found to be filled with a pinkish-white growth, which had begun to break down and ulcerate. It sprang from the anterior part of the upper surface of the left vocal cord.

Owing to the great age of the patient, the operation was divided into two stages: the first, tracheotomy; and, five days later, the second, thyrotomy, removing the growths and surrounding soft parts.

Although attended by the development of pneumonia during the second week after operation, the man made a good recovery. Nine months later he was still doing well, with steady improvement of the voice. Microscopical examination verified the case to be one of epithelioma.

CHAPTER LXXXII.

FOREIGN BODIES IN THE LARYNX.

FOREIGN bodies of one form or another frequently become lodged within the laryngeal cavity. This may occur from the forcible inspiration of any substance that may be in the mouth or pharynx during laughter, or from carelessness in the act of swallowing and in some cases even in ordinary inspiration. The names of foreign bodies that have obtained an entrance into the laryngeal cavity and lodged there are legion: bristles, fish-bones, needles, pins, coins, buttons, partial plates of false teeth, etc., as described in Roe's catalogue, have all of them been extracted from the larynx, and some of them quite

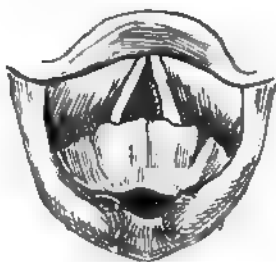


Fig. 136. Tooth plate in glottis. (After Lennox Browne.)

frequently. Sometimes the introduction of the foreign body has been from within. For instance, lumbricoides have found their way into the larynx from the œsophagus, and a number of instances have been recorded which ended fatally. Food has also been vomited up, to be thrown by inspiration into the larynx, the result being fatal. Children who have formed the habit of carrying foreign bodies in their mouths are particularly liable to the accident. While asleep the nervous sensibility of the pharynx and larynx are in a quiescent state, and the object slips into the larynx without warning. Women, who carry pins and needles in their mouths, are liable, during the acts of coughing or sneezing, to suddenly find the little instrument lodged in the cavity of the larynx. Figs. 136 and 137 represent a remarkable case

reported by Lennox Browne. The tooth-plate had remained in position in the larynx for two years and eight months without its presence being suspected, the patient being under the impression that she was suffering from either tuberculosis or cancer. The position left a space for breathing in front and also behind the foreign body. Fig. 137 exhibits the large size of the plate after its removal.

Symptomatology.—Coughing, irritation more or less, and a sense of strangulation are the ordinary symptoms. These vary in degree and character according to the size and form of the foreign body, modified also by the amount of nervous excitability possessed by the patient. When the body is large and soft, filling up the larynx, immediate suffocation is likely to be the result, unless relief can be at once obtained. Angular bodies, even when large, are not so quickly fatal, as respiration to a certain extent is practicable past the irregular

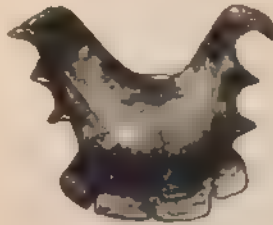


Fig. 137. Tooth plate removed. (After Lennox Browne.)

sides. Rough bodies are likely to produce inflammation. Pointed ones like spiculæ of bone, needles, etc., while they do not interfere with respiration, on the slightest motion produce pain, and from this cause often render deglutition impossible.

Diagnosis.—Quite frequently this may be positive from the personal experience of the patient. He knows the nature of the object, and how it found its way into the larynx. This can be verified by the use of the laryngoscope. In other instances the laryngoscope alone will have to be depended upon. Sometimes in children neither of these methods are of any avail. Kirstein's autoscope, when it can be applied, should reveal the condition of the larynx and the presence of the foreign body. Digital exploration, also, the finger being passed carefully into the larynx, while the organ is held in position by the fingers of the left hand, may lead to the discovery of the foreign body; but, when this is of a metallic character, nothing will reveal its form

and location so positively as examination by the Roentgen x-rays, so recently added to our list of methods of investigation.

Prognosis.—The accidental entrance of a foreign body into the larynx may always be considered a matter of serious moment. It may

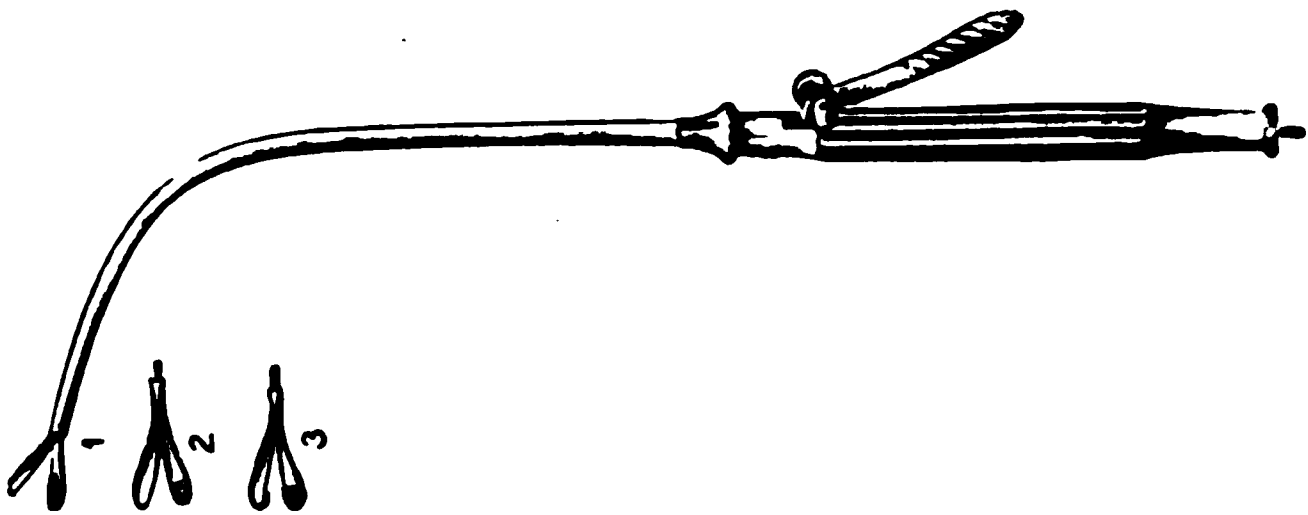


Fig. 138.—Laryngeal polypus-forceps, Mackenzie's, revolving, with three attachments.

possibly cause immediately a fatal result, or lead to it by continued obstruction and inflammatory action. There is also in many instances the possibility of the body settling still farther down into the nar-

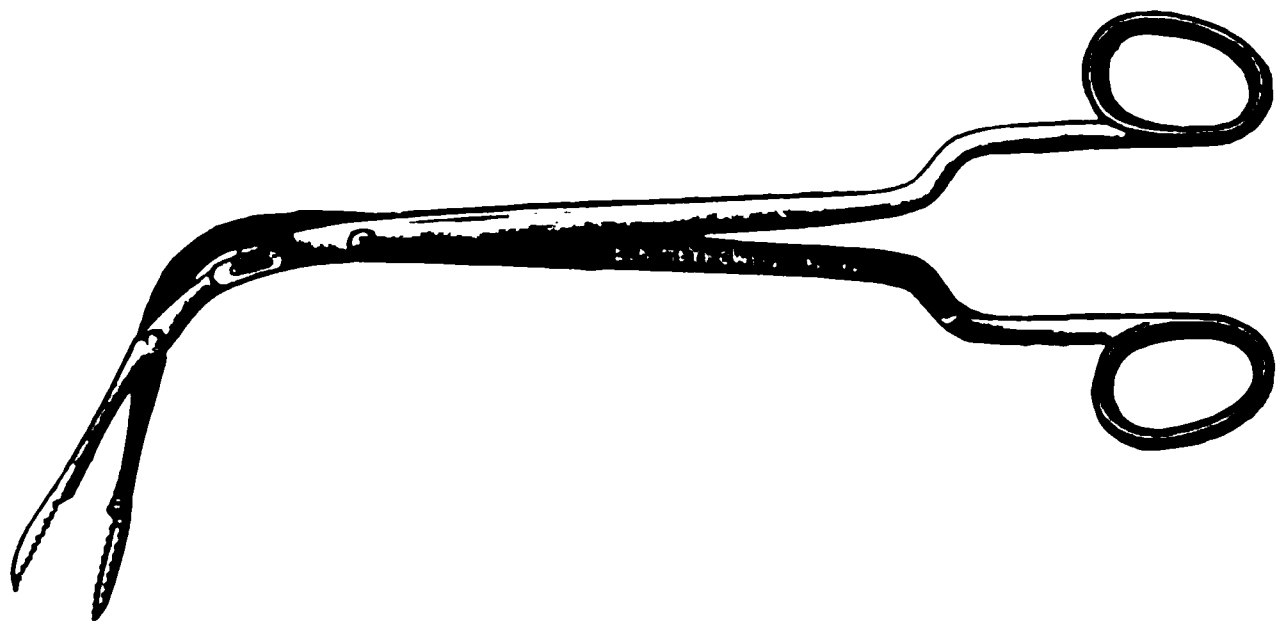


Fig. 139.—Laryngeal polypus forceps, Waxham's.

rower passage of the trachea. Still, in a large number of instances, when the body is compact in shape and without projecting angles, it has been coughed out without surgical interference. Sharply-angular bodies are not likely to be expelled by Nature's effort, and will require

to be removed before the patient can be relieved. When little round bodies like cherry-stones are drawn into the larynx, they usually pass the vocal cords and enter the trachea; and sometimes may get down

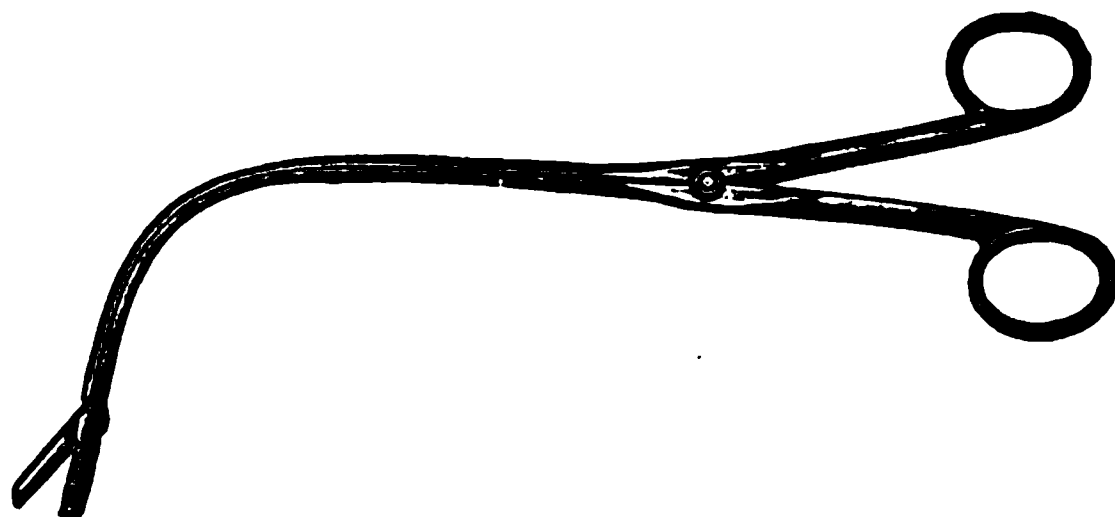


Fig. 140.—Laryngeal polypus-forceps, Fraenkel's, cutting-jaw.

into the bronchial tubes, completely obstructing respiration in the corresponding lung.

Treatment.—Sometimes properly combined respiratory effort may succeed in dislodging the foreign body. A slow, deep inspiration, so taken in order not to draw the object farther in, followed by a sharp,

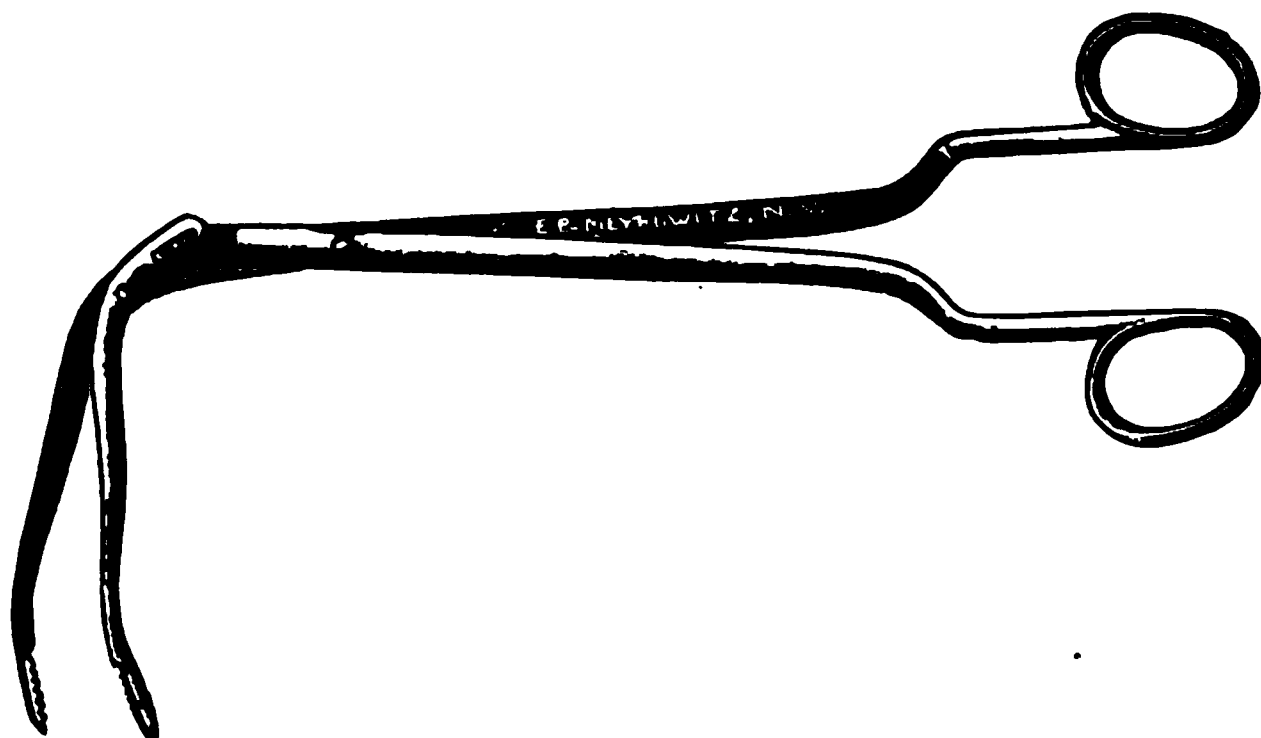


Fig. 141.—Laryngeal polypus-forceps, Mackenzie's, articulated.

sudden expiration, may possibly expel it. Reversing the patient, heels upward, may dislodge a heavy body. Forcible coughing may also aid.

These methods failing, laryngeal forceps guided by the throat-mirror may effect a removal. Of instruments, Mackenzie's, Waxham's,

Fraenkel's (Figs. 138 to 141), or any other good form may be used. Sometimes a snare carefully applied would lift out an angular body.

When the object is below the vocal cords tracheotomy may be required, and in cases where it is lodged within the larynx it can be best removed through the tracheal opening. In others it might be pressed up through the larynx from the trachea.

“Not infrequently after tracheotomy the body, if located below, may be expelled through the artificial opening, or may be forced up so that it can be grasped and removed. Should this not occur, the patient's body should be shaken or the inverted position assumed, with the hope of bringing the offending substance within reach of instrumentation. If it be impossible at the time of operation to locate the body, the edges of the trachea may be stitched to the integument and the wound left open for further search. The introduction of a small mirror may assist in locating the body. Blowing strongly into the trachea may assist in expulsion by the reactionary expiration, or the artificial production of cough by a feather may be also of use in dislodgment.” (Kyle.)

CHAPTER LXXXIII.

ROENTGEN RAYS IN LARYNGEAL SURGERY.

THIS was the title of a preliminary note by John MacIntyre, more than two years ago, upon what is acknowledged now to be a very important subject. The question he then asked—"Will this important discovery of the Roentgen rays be of use in the department of laryngology?"—has been answered over and over again by actual results in the affirmative.

Since that time the method of utilizing the Crookes tubes has been greatly improved. The shadows of the skeleton of the living body can be so clearly defined that every bone can be distinguished in position from the surrounding softer tissues. Still, rays of light pass through even the osseous frame-work, so that any impenetrable metallic substance, situated in the nose, larynx, or œsophagus can be distinctly seen by the x-rays.

Still further, the outlines of the skeleton can be so clearly delineated that any destruction of osseous tissue by malignant, syphilitic, or tuberculous ulceration can also be discovered, as well as fractures and malposition of bones in the different regions of the body.

Hence it can readily be seen that the discovery of the Roentgen rays was no light addition to the armamentarium of the throat-specialist.

Over and over again have foreign bodies in the larynx and œsophagus been located by the sciagraph, thus materially facilitating their removal. One remarkable thing is the clearness with which thin objects, such as needles and pins, can be defined while completely buried in the soft tissues of the body.

Two instances of this nature were recently reported by Walker Downie in an October issue of the *British Medical Journal*.

In the first, D. G., aged 19, put a pin in his mouth while asleep. The next morning the first mouthful of breakfast caused a sharp, lancinating pain in the throat on swallowing. This was followed by pain on right side of neck close to the thyroid cartilage. Careful examination with the laryngoscope revealed nothing. Two months later a satisfac-

tory lateral view of the parts was obtained by a Crookes tube, and the pin discovered to be located in the centre of the thyroid cartilage. Chloroform was administered and the cartilage laid bare in the middle line. On cutting through the perichondrium, the point of the knife touched the head of the pin. During the two months which time it had been in the larynx the pin had ulcerated through the cartilage. It was readily extracted and proved to be bent upon itself.

The other case occurred in a girl aged 18. She accidentally coughed with a pin between her teeth. As a result, the pin slipped down her throat. She thought she had swallowed it, and for several days there was no pain. Four days later she turned sick after eating and vomited. While in the act she felt a sharp pain in the right side of the throat, close to the thyroid cartilage. On being examined with the laryngoscope nothing whatever could be seen of the foreign body. A sciagraph, however, taken at once revealed its situation. The next day the larynx was anæsthetized with cocaine, and curved forceps were passed firmly and deeply into the hyoid fossa. The head of the pin was touched and grasped and the pin was withdrawn.

A number of instances have also been recorded in which sciagraphs have been taken of coins located in the œsophagus, the view by the x-rays being the guide by which successful removal was accomplished.

CHAPTER LXXXIV.

OPERATIONS FOR NASAL DEFORMITIES.

WHEN these deformities arise from malformation, defective development, or pathological lesion of the internal nose, they should rightly be considered as belonging to the legitimate field of the rhinologist. When, however, they owe their origin to external injury or



Fig. 142. Lead plate for nasal arch.



Fig. 143—Steel pin for nasal transfixion.

disease, they would seem more naturally to belong to the domain of the general surgeon.

It is of the former class that this chapter treats, and particularly of that unsightly deformity commonly called "saddle-nose." This may arise from a variety of causes, but it consists, as a rule, of a sinking in of the bridge, owing to the destruction of the cartilaginous septum.

Professor Annandale (*British Medical Journal*, November, 1897) has thrown out some valuable suggestions for the treatment of this class of cases. For fifteen years he has practiced what he calls "slinging" of the depressed tissues up into their natural position, whether bony or otherwise.

The appliances used consist of: 1. A piece of sheet-lead (Fig. 142) formed into an arch with a ledge on each side to rest on each cheek. The arch should be slightly higher than the nasal bones when in their normal position. On each side of the arch, opposite the bridge of the nose, a slit is made from the cheek-ledge up toward the summit of the arch. 2. A steel pin (Fig. 143) about five centimetres long with a point at one end and a cap at the other—the whole central part being a screw with a nut to be applied to the point.

To raise the depressed bone the pin is passed deeply through the nose from side to side opposite the bridge or more depressed portion. The nose is then gently lifted up by means of the pin, and the leaden arch slipped over it, the two ends projecting out through the notches. The nut is then screwed on to give lateral support and firmness, and silver wire passed in figure-of-eight around the ends of the needle and over the arch, to put slight traction upon the raised tissues. A cap is also fitted to the needle-point to prevent injury to the cheek. The apparatus requires to be carefully watched to secure good results. The time required for treatment varies, the object being to retain the apparatus until the tissues have been solidified and accustomed to their new position. Fig. 144 represents the appliance in position.

E. C. Ellet (*Memphis Medical Monthly*, September, 1897) reports a case of successful treatment of saddle-nose by surgical operation. In his case the cartilaginous septum had been destroyed by erysipelatous abscess, resulting in severe depression of the bridge.

The operation practiced for the removal of the deformity consisted, first, in an incision twenty-five millimetres long, down the medial line of the nose, extending above and below the depression. The tissues were then dissected back freely on each side. After checking the hemorrhage with hot compresses an oval platinum plate was inserted over the depressed dorsum. This plate had an area of twenty by fifteen millimetres, was curved from side to side to conform to the natural shape of the nose, and was perforated to allow of more perfect retention and fixation during the process of healing. Before insertion the plate had been boiled in soda solution, was preserved in alcohol, and lastly immersed in bichloride solution. After putting the plate

in place the flaps were drawn together and sutured over it, the wound being closed aseptically. After healing the whole nose was solid. The deformity had also been successfully removed.

Roe, of Rochester, has also written somewhat extensively lately upon the "correction of nasal deformities by subcutaneous operation," and the following is an abstract of his paper (*British Medical Journal*, November, 1897) upon the subject, read at the Montreal meeting of the association:—

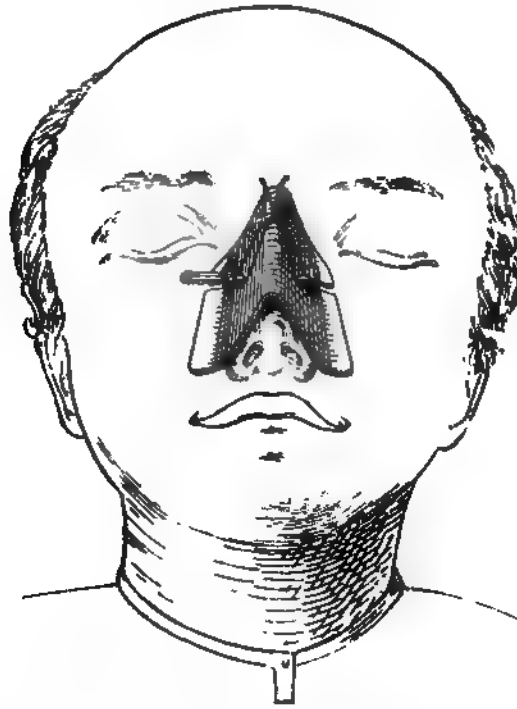


Fig. 144.—Nasal appliance in position. (After Annandale.)

"Dr. Roe pointed out that the early advantage of subcutaneous operations was the exclusion of air from the wound, thereby avoiding the subsequent inflammation that followed the exposure of the wound to the air, but that at the present time the only advantage of performing operations subcutaneously was the avoidance of a wound of the skin on any of the exposed portions of the body. The importance of correcting nasal deformities on account of the prominence of the nose,

and the conscious effect of such deformities in influencing the habits, thoughts, and social life of a person were then pointed out, and also the importance of correcting these deformities without wounding the skin, so as to leave as few traces as possible of the previous disfigurement. Nasal deformities were usually divided into two main classes: idiopathic, or congenital, and traumatic, or acquired; but, from the surgical stand-point, Roe classified them into the deformities which affected the bony portion of the nose and the deformities which affected the cartilaginous portion.

"Deformities of the bony portion might be subdivided into (*a*) vertical—that is, those which distorted the profile, in which the dorsal line was too convex or too concave; and (*b*) lateral—that is, those which, when viewed from the front, presented unusual deviations from the normal contour, whereby the bony portion might be either spatulated or deflected.

"Deformities of the cartilaginous portion might be subdivided into (*a*) those which affected the tip of the nose, whether excessive or defective in the amount of tissue or distorted from its normal direction, and (*b*) those which affected the wings of the nose, which might be either collapsed or abnormally expanded.

"This classification of nasal deformities, however, did not apply to or include those deformities resulting from extensive destruction of the hard or soft parts by syphilis, lupus, or other diseases, or by accidents in which metallic or other artificial supports or plastic operations involving the integument were required for their correction.

"Roe then described the different deformities as they were found, and the etiological relations which they sustained to local causes and various systemic conditions.

"In the treatment of nasal deformities he pointed out that the beauty of the nose depended almost entirely upon its symmetry, so long as the disproportionate relation between the size of the nose and the size of the face was not too great; therefore, in correcting the deformities of the nose it was necessary to study the symmetrical relations of the different parts of the nose to one another, rather than its proportionate relations to the face. He also pointed out that, owing to the great variety of causes and conditions of the deformities of the nose, the operations required for the correction of these deformities must be equally varied.

"There were, however, general underlying principles governing the different operations which must be observed in order to accom-

plish the desired results. Thus, in convex vertical deformities of the bony portion of the nose, or excessive development of the tissue of the tip of the nose, the excessive or redundant tissue must be removed; whereas, in the concave vertical deformity of the bony portion of the nose, or the defective development of the end of the nose, the hollow portion must be filled in with tissue taken from some other portion of the nose where it could be spared, and the elevated portions reduced, so as to make the nose symmetrical. In the case of injury to the nose, in which there was displacement rather than destruction of the tissues, the operation consisted in placing the tissues in their original position, or so adapting them as to render the contour of the nose symmetrical. In every instance, however, the operation was to be performed subcutaneously from the interior of the nose.

"The writer then described a number of cases, illustrating the manner in which the various operations were performed, and exhibited enlarged photographic illustrations of patients before and after operations. He also stated that there were three conditions which must be observed in order to insure success in these operations:—

"1. The first was thorough antiseptic precautions, for, if suppuration in the wound should take place, ingrafted tissues would be destroyed, and not only the object of the operation be defeated, but the deformity of the nose would be increased thereby.

"2. In the next place, the plan of the operation must be carefully studied, in order that all the tissues at disposal might be utilized to the best advantage.

"3. In the third place, great care and attention, subsequent to operation, were as important as the operation itself, for, no matter how well directed the operation might be, the object could not be attained unless scrupulous attention was paid to the healing process. The parts must not only be held in place by retentive appliances, but the shape of these appliances and the dressing must often be changed from day to day, as the swelling subsided and the union of the parts took place.

"Frequently the principal or main operation must be supplemented by minor operations for the correction of slight defects. An unduly prominent portion might require lowering and a depressed part raising, and so on until the work was completed."

CHAPTER LXXXV.

OPERATIONS FOR CLEFT PALATE.

It is widely conceded that operations for cleft palate are inadvisable before the end of the second year. First operations should be performed, if possible, about that period, and secondary operations by the fourth or fifth year when necessary. Still further, final operations upon the hard palate, or to completely close openings still left in the soft palate, should always be done by the tenth or twelfth year at the latest. After this age, the available tissues are too scanty, and the possibility of improving the voice too limited, to render operation justifiable, and the most that can be done is in the way of fixation of obturators, to overcome to some extent the natural deformity.

Careful observations made by many experienced surgeons have also brought out a number of important facts, which help as guides in the treatment of this defect in development. When there is hare-lip together with cleft palate it is advisable, according to some authorities, to operate on the lip even in early infancy, in order to insure efficient nursing, while the operation in the palate is deferred to a later date. The chief objection to surgical interference with the hard or soft palate during the first two years of life is the extreme delicacy of the tissues affected, with their liability to tear upon the slightest traction.

The healthier and better tempered the child, the less voracious the appetite; and, the smaller the cleft, the earlier may the operation be performed.

The higher the vault of the hard palate, the more likely is the operation to be successful, as there is a better supply of soft tissue from which to construct the necessary flaps.

The longer the palate, also, from before backward, the more hopeful the prognosis after treatment, as the traction toward the centre has always a tendency to shorten the antero-posterior diameter of the palate.

In reply to anxious friends who are naturally alarmed at the difficulty in nursing produced by the presence of cleft palate, they can

be assured that this can be accomplished readily by the use of a nursing-bottle with a long nipple with the opening on the lower side or with a projecting flap on the upper one. By putting either of these well into the mouth, the opening in the palate will, to a large extent, be closed. The child can thus, by being better able to swallow, attain the strength and age necessary for successful treatment.

Staphylorrhaphy is the name applied to operation for the closure of the cleft in the soft palate. This is an old operation, and has been performed for more than a century. There are many methods by which it may be done. Perhaps the simplest is the one generally adopted and described so clearly by J. W. MacDonald in his work upon "Surgical Diagnosis and Treatment," 1898. The position he chooses is for the patient to lie on a high table with the head turned to the right side, so that the blood will not gravitate into the pharynx. Churchill's position would seem to be superior to this. He places the patient upon his back with the head at right angles to the spine, hanging over the end of the table and supported by an assistant. In this position the blood will drain into the naso-pharynx and could readily be sponged away.

The stages of the operation are the following:—

1. After anæsthetizing with chloroform or A. C. E., a mouth-gag is inserted and the throat is rendered as aseptic as possible. The end of one side of the cleft is then held tense by a tenaculum forceps and a narrow strip cut off from the edge of the cleft, from the free margin to the angle. This may be done by a thin-bladed knife or a sharp, narrow, angular scissors. In this preparatory stage both sides are treated alike, the object being to make clear-cut, raw edges throughout.

2. The sutures may be of silver wire, chromicized catgut, or silk, the last mentioned being as good as any. Of needles, although many kinds are used, the half-curve Hagedorn in a needle-holder is recommended by MacDonald as generally applicable. The first needle should be inserted about 6 millimetres from the margin on one side and about 12 millimetres from the angle, and passed directly through that portion of the velum. It should then be reinserted from behind forward on the other side of the cleft at similar distances, the silk thread carefully drawn through by means of forceps, and the needle withdrawn. Other needles should be similarly placed at distances of about 12 millimetres in a similar way until the posterior end of the cleft is reached.

3. If the cleft can now be closed without too much tension the sutures may at once be carefully tied and the threads cut off. If, how-

ever, the strain is too great, the tensor palati muscles must be cut before closing the cleft. This can be done by making an incision into the soft palate immediately internal to the hamular process and cutting upward until the muscles are severed. This should be done on each side, and then the sutures drawn together and tied. These should not be removed until the seventh or eighth day.

Throughout the operation the bleeding should be controlled by careful pressure upon the bleeding spots with small pledgets of antiseptic absorbent cotton, care being taken to avoid all unnecessary disturbance of the raw surfaces. When the operation is over the parts should be lightly dusted with iodoform and the incision painted with iodoformized collodion.

Uranoplasty.—The more difficult and serious operation of closing fissure of the hard palate is usually performed after Sir William Fergusson's plan. First the edges of the cleft should be pared as in the operation for staphylorrhaphy. The sutures also inserted, but left untied and held aside by an assistant. Then midway between the cleft and the alveolar margin an incision is made down to the bone, the incision being of equal length with the cleft in the hard palate. The bone is then carefully cut through with the chisel and forced over toward the mesial line. The sutures are then tied and the lateral incisions packed with iodoform gauze.

If the operation is successful, the fissures close up by new bone-formation, and a complete hard palate is eventually formed.

Mason Warren, of Boston, was among the first to close the hard palate without cutting the bone. His plan was to detach flaps of combined periosteum and mucous membrane from the hard palate by means of a periosteal elevator, taking care not to tear the arteries of the anterior and posterior palatine canals. The soft palate was also separated on each side from the horizontal plates of the two palate-bones. Before tying the sutures, cuts were made, if required, midway between the fissure and the alveolar margin on each side.

The after-treatment in all operations is an important matter. Mild antiseptic irrigation is always needed. It is better also to apply the iodoformized collodion no matter what operation is performed. The food should be of fluid form for a number of days and the sutures should never be removed inside of a week. The hands of the child when necessary should be controlled, and a careful watch maintained, until all danger of injury to the tissues be over.

When isolated spots fail to unite, they may sometimes be encour-

aged to close by granulation, the parts being touched by nitrate of silver or singed by galvanocautery.

With the object of improving voice-production at as early an age as possible, Brophy, of Chicago, has recently devised and practiced successfully a special method of treatment which he considers applicable even in early infancy. By it he claims that the muscles, instead of being allowed to atrophy, are developed from the first, and the nasal tone caused by the presence of the cleft is never formed.

After vivifying the tissues of the soft cleft he trims the bony edges of the hard cleft, thus favoring their union when brought into contact. Then he passes a double silver-wire suture through the palatal process of the palate-bone and another through the palatal process of the superior maxillary. This is done on each side. Lead buttons made to suit the parts and perforated for the wires are then placed in position, one on each side, and the wires are passed through them. To approximate the bony cleft, the right and left wires nearest the apex are twisted together, putting tension upon the parts, the same to be done with the anterior pair. If sufficient tension can be safely put upon them to draw the two sides of the cleft together, incisions will not be necessary. If not, then the hard palate on each side between the cleft and the alveolar is to be cut subcutaneously, thus allowing of greater tension. The buttons can then be drawn closer together by twisting the wire sutures and held in position until union takes place. The parts should now be thoroughly dried, and whenever necessary fine sutures be put in to bring the tissues into perfect apposition.

Complete control of the child is always required for some days after operation. Antiseptic treatment of the mouth should also be attended to and only soft, liquid food administered.

As the operative treatment practiced by Edmund Owen, and described by him at the last annual meeting of the British Medical Association, differs somewhat from any of the foregoing methods, and sustains some points that are new, this chapter will be closed with a brief description of the three stages which he defines:—

1. Before operation. It is imperative that the child should be put in a good state of health. The chronic dyspepsia from which many children having cleft palate suffer should be removed. For this, the administration of a rhubarb-and-soda mixture is an excellent thing. All carious teeth should be removed or cleaned and filled. Adenoids and enlarged tonsils, if present, should also be taken away before operating upon the cleft, and the parts given time to heal.

2. Operation. He uses a modified Smith gag armed with stout spikes, which fit into the crevices of the teeth or into the gums, as he says "harmlessly," but insuring against any slipping of the instrument during the operation. The anæsthetic used is chloroform.

After anæsthesia is produced a strong suture is passed through the tip of the tongue, and the organ drawn well forward before the gag is inserted. The child is then brought to the end of the table with the head hanging over to keep the blood out of the larynx, much as in Churchill's position.

After denuding the edges of the cleft as in the ordinary method he makes a long incision on the inner side of each alveolar process. These incisions are usually very free, traversing the attachment of the levator and tensor palati muscles as well as the palato-pharyngeus. Then the raspatory is introduced and the muco-periosteal flaps are raised. The attachment also of the aponeurosis of the velum to the posterior border of the hard palate is divided with curved scissors. As these incisions produce a good deal of hæmorrhage, this is checked by firm pressure with sponges before the sutures are inserted.

Owen prefers silver-wire sutures to any others. He uses a modification of Smith's needle, and when the cleft is complete ten or twelve sutures may require to be inserted.

One important point that he insists upon is that there should be no tension whatever upon the flaps. The incisions at the sides, although almost as wide as the original cleft, usually heal without difficulty.

3. After operation. As anæsthesia passes off, the child may vomit, but unless this is very prolonged it will not interfere in any way with the sutures. In order to favor mouth-drainage, the child should be so placed upon the pillow that the blood will flow out upon absorbent cotton arranged for the purpose.

The best food to give is home-made beef-jelly, as it slips down without effort.

As soon as possible after operation the child may be taken out of bed, and even out of the house, to secure the benefit of inhaling the pure, fresh air.

Washing the mouth with solution of boric acid or other antiseptic should not be insisted on, unless the child itself is willing, as the struggle of opposition could do more harm than the washing would do good.

If septic infection takes place we must await the result. The wound may be opened by staphylococcic invasion; but after a time,

with proper care, the fever will subside, and the sundered and swollen edges of the cleft will look bright and clean again, and then the operation may be repeated, though in a minor degree, and with every probability of being successful.

Dr. Owen is of the opinion that, while nothing is so prejudicial to prompt union after staphylorrhaphy as septic infection, yet, having once recovered from the septicæmia, a complete immunity is for a time acquired as a result, and further operation may be at once performed with the prospect of a good union.

INDEX TO LITERARY REFERENCES.

- Abbott, 70.
 Abercrombie, 293.
 Abraham, 414.
 Adenot, 137.
 Alexander, 174.
 Annandale, 450.
 Appert, 104.
 Archambault, 406.
 Arnold, 292.
 Asch, 406.
- Baber, 56, 111.
 Babès, 411.
 Baker, 82.
 Ballinger, 83.
 Barrett, 206.
 Beale, Clifford, 398.
 Bellocq, 108.
 Bergengrün, 416.
 Bilbroth, 116, 128.
 Birkett, 230.
 Bishop, 30, 35, 38, 64, 65, 94, 96, 99,
 101, 213, 245, 402.
 Blackley, 95.
 Blake, 123.
 Bonet, 104.
 Bostock, 93.
 Bosworth, 18, 24, 36, 38, 41, 44, 60,
 62, 75, 83, 89, 90, 91, 95, 112, 115,
 119, 122, 124, 138, 141, 150, 165, 169,
 170, 194, 195, 218, 229, 237, 255, 279,
 286, 311, 358, 365, 393, 401, 437.
 Bovill, 110.
 Bowlby, 295.
 Braun, 39, 64, 65.
 Bresgen, 148.
 Brophy, 457.
 Brown, Moreau, 167.
 Browne, Lennox, 35, 57, 59, 64, 102,
 120, 122, 141, 148, 159, 174, 192, 209,
 213, 286, 299, 390, 402, 407, 412, 414,
 434, 437, 443.
 Brüns, 125.
 Bruschke, 194.
 Butler, 115.
 Butts, 211.
- Canquoin, 150.
 Capart, 223, 225.
 Carter, 33.
 Cary, 353.
 Casselberry, 83, 124, 130, 245, 397.
- Chapelle, 403.
 Chatellier, 165.
 Cheval, 83, 106, 167, 307.
 Chiari, 144, 458.
 Churchill, 455, 458.
 Clark, 111.
 Cloquet, 114.
 Coakley, 137.
 Cohen, J. Solis-, 41, 103, 440, 441.
 Coley, 441.
 Colin, 279, 280.
 Collier, 60, 75, 81, 211.
 Cooper, 170.
 Corneil, 149.
 Courmont, 319.
 Courtade, 391.
 Crookes, 447, 448.
 Curtiss, Holbrook, 83, 180.
- Damaschino, 279.
 Damieno, 387, 388.
 Davidson, 62.
 De Blois, 255.
 Debrousses, 396.
 De la Sota, 396, 414.
 Delavan, Bryson, 57, 64, 94, 122, 134,
 191, 209, 211, 228, 440.
 Demochowski, 165.
 Demoe, 141.
 Desault, 170.
 De Simoni, 264.
 Devasse, 151.
 Deville, 151.
 Dobell, 38.
 Dontrelepont, 150.
 Downie, Walker, 447.
 Drake, 60.
 Dreyfuss, 447.
 Dupage, 316.
- Ellet, E. C., 450.
 Erichsen, 115.
- Ferguson, Sir W., 456.
 Ferrard, 316.
 Flatau, 141.
 Flateau, 180.
 Fox, Hingston, 194.
 Fraenkel, 41, 59, 62, 159, 165, 356.
 French, 92.
 Freudenthal, 149.
 Friedländer, 59.

Gardi, 110.
 Gavel, 169.
 Gee, 293.
 Gehrardt, 390.
 Gelli, 60.
 Gerdy, 130.
 Gibb, J. S., 234.
 Gleason, 107.
 Gleitsmann, 178, 208, 214, 403.
 Glück, 410.
 Goldstein, 114.
 Gosselin, 132.
 Gottstein, 60, 64, 214, 389.
 Gouguenheim, 168.
 Grant, Dundas, 56, 148, 168, 169, 170.
 Grünwald, 57, 119, 178.
 Gürlt, 437.

Hall, de Havilland, 209.
 Hall, Marshall, 423.
 Hajek, 175, 181.
 Hansen, 410, 411.
 Harrison, 170.
 Haton, 141.
 Helot, 55.
 Hendley, 110.
 Heryng, 169, 279, 296, 364, 389.
 Hewlett, 143.
 Hilaire, 165.
 Hill, 110, 143.
 His, 191.
 Hodenpyl, 134.
 Hopkins, 141.
 Hopmann, 126.
 Horne, Joseph, 128, 234.
 Hunt, Middlemas, 71, 392, 441.
 Hunter, 424.

Ingals, Fletcher, 83, 102, 107, 177, 225, 397.

Jackson, Hughlings-, 423.
 Jarvis, 54, 76, 122.
 Jeanselme, 410.
 Joal, 94, 104.
 Johnson, 134.
 Jones, Carmault, 28, 56.
 Jourdain, 169.
 Jullien, 303.
 Jurasz, 439.

Kanthack, 162.
 Kelly, Brown, 134.
 Kirstein, 345, 346, 347, 349, 368, 443.
 Klebs, 390.
 Knight, C. H., 131, 174, 196, 402, 430.
 Koch, 300.
 Krause, 170, 295, 402.

Kröulein, 315.
 Kyle, 83, 148, 255, 306, 317.

Lahory, 114.
 Lake, 71, 83, 88, 246, 404.
 Lameres, 371.
 Lange, Victor, 87.
 Laurens, 410.
 Ledermann, 87.
 Lefferts, 134, 406.
 Leflaive, 94.
 Leland, 245.
 Lermoyez, 160.
 Levi, 371, 374.
 Liaras, 371.
 Lincoln, 225.
 Lindemann, 212.
 Loder, 104.
 Logan, 229.
 Lowenberg, 59, 214, 384.
 Lowndes, 112.
 Lugol, 278.
 Luning, 393.
 Luschka, 191, 203.

MacDonald, Greville, 168, 207.
 MacDonald, J. W., 455.
 MacIntyre, 447.
 Mackenzie, Hunter, 434, 435.
 Mackenzie, J. Noland, 59, 94, 100, 115, 175, 420.
 Mackenzie, Sir Morell, 17, 41, 74, 122, 255, 311, 412, 419, 423.
 McBride, 119, 126, 205.
 Magnan, 319.
 Major, 396, 397.
 Marsh, 110.
 Martin, 216.
 Mathieu, 267, 268.
 Mayer, 406.
 Menzes, 316.
 Meyer, Wilhelm, 204, 208, 211.
 Michel, 125.
 Mickulicz, 316.
 Milligan, 168, 170.
 Moldenhaur, 165.
 Morier, 171.
 Mount Bleyer, 419.
 Moure, 119, 196, 417.
 Mulhall, 67, 68.
 Murdoch, 70.
 Murray, 296, 402.
 Myles, 86, 176, 179, 181.

Navratil, 419.
 Neisse, 146.
 Newcombe, 216, 397.
 Nyles, 165.

O'Dwyer, 350, 351, 353, 354.
 Otto, 209.
 Owen, 457, 459.

Pakes, 247.
 Paterson, 191.
 Patterson, 230.
 Pawlowsky, 149, 150.
 Pfan, 149.
 Pegler, 127.
 Permewan, 33.
 Pouchet, 233.
 Primrose, 9, 79.
 Pryor, 374.
 Pynchon, 207, 262, 271.

Railton, 434.
 Réclus, 234.
 Reed, 146.
 Reeve, R. A., 218, 220.
 Reid, 246.
 Reidel, 143.
 Richardson, 280.
 Robertson, 171, 321.
 Robinson, Beverly, 165.
 Roe, 25, 76, 289, 451, 452.
 Roentgen, 447, 448.
 Roosa, 185.
 Rosenberg, 181, 392.
 Rosenmüller, 31.
 Ross, G. F., 428.
 Roy, 119.

Sach, 143.
 Saint-Hilaire, 165.
 Sajous, 38, 62, 64, 100, 154.
 Sandford, 211.
 Sappy, 437.
 Schech, 122.
 Scheppegrell, 115, 403.
 Schiffer, 71, 165.
 Schubert, 281.
 Schüller, 146.
 Schultze, 11.
 Seiler, 60, 125, 130.
 Semon, Sir Felix, 194, 426.
 Sendziak, 272.
 Shurly, 18, 54, 59, 60, 64, 102, 122, 146.
 Siebenmann, 280, 281.
 Siethoff, 218.

Sikkel, 128.
 Simonowsky, 402.
 Smith, Eustace, 425.
 Sokolowski, 272.
 Somers, 233.
 Spicer, Scanes, 114, 171.
 Stöerck, 390.
 Stoker, 131.
 Straight, Howard, 103.
 Swain, 117, 119, 194.
 Symonds, 143.
 Syne, 141.

Taylor, Frederic, 424.
 Thomson, St. Clair, 103, 133, 143.
 Thorner, Max, 141, 221, 302, 345, 349, 353, 374.
 Tiarus, 374.
 Toeplitz, 279.
 Tornwaldt, 203.
 Trendelenburg, 76.
 Tresilian, 146, 148.
 Tyrrell, Shawe, 96.
 Velpeau, 246.
 Verneuil, 126, 141.
 Volkmann, 147.
 Voltolini, 125.

Wagner, 14, 41, 103, 194, 279.
 Walton, 295.
 Ward, 126.
 Warren, 456.
 Watson, Arthur, 86, 134, 143.
 Webster, 206.
 Weichselbaum, 143, 159.
 Weil, 221.
 Williams, 143.
 Willigk, 143.
 Williston, 114.
 Wingrave. Wyatt, 58, 61.
 Wishart, 73, 155.
 Woakes, 119, 175.
 Wolfenden, 272, 274.
 Wright, Jonathan, 92, 115, 119, 175, 211.

Yearsley, 234.

Zeim, 76, 81, 170.
 Zuckerkandl, 13, 74, 76, 119, 165.

GENERAL INDEX.

SECTION I.—DISEASES OF THE NOSE.

- Accessory cavities, anatomy of, 7.
diseases of, 159.
Acute sinusitis, 159.
etiology, 159.
symptomatology, 160.
treatment, 161.
Adenoma of the nasal passages, 132.
Anatomy of the external nose, 3.
accessory sinuses, 7.
ethmoid cells, 7.
frontal sinus, 6.
maxillary sinus, 8.
nasal fossæ, 3, 4.
septum, 4.
sphenoid sinus, 7.
turbinated bones, 5.
Angioma of the passages, 132.
treatment, 133.
Anosmia, 104.
Antrum, cyst of, 174.
Antrum of Highmore, 8.
Aprosexia, 121.
Asthma, reflex, 120.
Atrophic rhinitis, 58.
- Belloq's cannula in nasal hæmorrhage, 108.
Blackley's investigations, 95.
Blood-vessels of the nose, 11.
Bone, superior turbinated, 5.
middle turbinated, 5.
inferior turbinated, 6.
- Carcinoma of the nasal passages, 141.
diagnosis, 142.
etiology, 141.
pathology, 141.
prognosis, 142.
symptomatology, 141.
treatment, 142.
Chondroma of the nasal passages, 136.
Chronic disease of antrum of Highmore, 162.
diagnosis, 166.
exploratory puncture, 167.
transillumination, 168.
etiology, 165.
pathology, 162.
prognosis, 169.
symptomatology, 165.
- Chronic disease of antrum of Highmore, treatment, 169.
combined operation, 171.
direct irrigation, 169.
opening of inferior meatus, 169, 170.
alveolus, 170.
canine fossa, 170.
Columnar cartilage, distortion of, 89, 90.
perforations of, 91.
Congenital syphilis, 155.
Cyst of the antrum, 174.
Cystoma of the nose, 134.
- Deviations of nasal septum, 74.
Disease of the frontal sinus, 181.
Disease of the sphenoid sinus, 180.
Diseases of the accessory sinuses, 159.
Diseases of the ethmoid cells, 175.
diagnosis, 177.
etiology, 176.
pathology, 175.
prognosis, 177.
symptomatology, 177.
treatment, 178.
- Electrocautery puncture in hypertrophic rhinitis, 55.
Electrolysis in septal deformity, 84.
Epistaxis, 106.
diagnosis, 107.
etiology, 106.
pathology, 106.
prognosis, 107.
symptomatology, 106.
treatment, 107.
Ethmoid cells, 7.
disease of, 175.
- Fibroma of the nasal passages, 128.
diagnosis, 129.
etiology, 128.
pathology, 128.
prognosis, 129.
symptomatology, 128.
treatment, 129.
- Foreign bodies in the nose, 112.
diagnosis, 112.
symptomatology, 112.
treatment, 113.

- Furunculosis, 105.
 Galvanocautery-battery, 53.
 Glanders, 148.
 Glands of the nose, 11.
 Gottstein's plugs, 64.
 Grünwald's operation, 57.
 Hay fever, or vasomotor rhinitis, 93.
 diagnosis, 98.
 duration of, 97, 98.
 etiology, 94.
 geographical area, 98.
 pathology, 93.
 periodicity of, 97.
 preventive measures, 98.
 prognosis, 98.
 symptomatology, 96.
 treatment, 99.
 constitutional treatment, 99.
 treatment of nasal passages, 100.
 Hydrorrhœa, nasal, 103.
 Hypertrophic rhinitis, 45.
 Innervation of the nose, 11.
 Instruments used in nose and throat,
 15.
 electric photophone, 15.
 laryngoscope, 17.
 nasal specula, 18.
 powder-blowers, 24.
 saws, etc., 25.
 snare, etc., 27.
 spokeshaves, etc., 28.
 Lacrymal canal, 7.
 Lupus of the nose, 146.
 diagnosis, 147.
 etiology, 146.
 pathology, 146.
 prognosis, 147.
 symptomatology, 146.
 treatment, 147.
 Massage in atrophic rhinitis, 64.
 Menthol in diseases of nose and throat,
 35.
 Nasal bones, 3.
 Nasal deformities, operations for, 449.
 Nasal hydrorrhœa, 103.
 Nasal polypi, 116.
 diagnosis, 121.
 etiology, 118.
 pathology, 116.
 prognosis, 121.
 reflex disturbances, 120.
 sex, 119.
 site of attachment, 120.
 Nasal polypi, symptomatology, 119.
 treatment, 122.
 by electrolysis, 125.
 by forceps, 125.
 by snares, 122, 123.
 Nasal septum, deformities, 74.
 diagnosis, 81.
 etiology, 75.
 prognosis, 82.
 sequelæ after operation, 87.
 symptomatology, 81.
 treatment, 83.
 electrolysis, 84.
 methods by Bosworth, 83.
 methods by Casselberry, 84.
 methods by Curtiss, 83.
 methods by Ingals, 83.
 methods by Kyle, 83.
 methods by Lake, 88.
 methods by Watson, 86.
 rubber splints, 88.
 silver tubes, 85.
 Nasal septum, deformities of, 74.
 conditions in actual life, 75.
 skulls of aborigines, 74.
 of civilized races, 74.
 Nose in phonation, 12.
 Nose in respiration, 13.
 Olfactory area of the nose, 12.
 Operations for nasal deformities, 449.
 Annandale's method, 450.
 Ellet's method, 450.
 Roe's method, 451.
 Osteoma of the nose, 136.
 etiology, 137.
 pathology, 137.
 symptomatology, 137.
 treatment, 137.
 Papilloma of the nose, 126.
 treatment, 126.
 Parasites, nasal, 113.
 symptomatology, 114.
 Texas screwworm, 114.
 treatment, 115.
 Parosmia, 105.
 Physiology of nose and accessory si-
 nuses, 12.
 nose in phonation, 12.
 in respiration, 13.
 sense of smell, 12.
 Posterior rhinoscopic image, 30.
 Rhinitis, acute, 32.
 diagnosis, 33.
 etiology, 32.
 pathology, 32.
 prognosis, 33.

- Rhinitis, acute, prophylaxis, 33.**
 symptomatology, 33.
 treatment, 34.
- Rhinitis, atrophic, 58.**
 diagnosis, 61.
 etiology, 59.
 pathology, 58.
 prognosis, 62.
 symptomatology, 60.
 treatment, 62.
 by Gottstein's plugs, 64.
 by massage, 64.
- Rhinitis, chronic, 37.**
 diagnosis, 38.
 etiology, 37.
 pathology, 37.
 prognosis, 38.
 symptomatology, 37.
 treatment, 38.
 massage, 39.
- Rhinitis fibrinosa, 70.**
 cases by Brun Murdoch, 70.
 cases by Middlemas Hunt, 71.
 cases by Richard Lake, 71.
 cases by Schiffer, 71.
- Rhinitis, hypertrophic, 45.**
 diagnosis, 50.
 etiology, 47.
 pathology, 45.
 prognosis, 51.
 symptomatology, 49.
 treatment, 51.
 by electrolysis, 55.
 by turbinectomy, 56.
- Rhinitis, oedematosa, 67.**
 treatment, 68.
- Rhinitis purulentia of children, 41.**
 diagnosis, 42.
 etiology, 42.
 pathology, 41.
 prognosis, 43.
 symptomatology, 42.
 treatment, 43.
- Rhinoliths, 110.**
 diagnosis, 111.
 prognosis, 111.
 symptomatology, 110.
 treatment, 111.
- Rhinoscleroma, 149.**
 treatment, 149.
- Sarcoma of the nasal passages, 138.**
 diagnosis, 139.
 etiology, 138.
 pathology, 138.
 prognosis, 139.
 symptomatology, 139.
 treatment, 139.
- Sense of smell, 12.**
- Sensitive areas, 94.**
- Septum, anatomy, 3.**
 abscess of, 92.
 bilateral tumors of, 127.
 perforation of, 91.
 treatment of, 91.
 ulceration of, 92.
- Sinus, frontal, 7.**
 maxillary, 8.
 sphenoid, 6.
- Soft palate, 13.**
- Syphilis, 151.**
 diagnosis, 153.
 pathology, 152.
 prognosis, 154.
 symptomatology, 152.
 primary, 152.
 secondary, 152.
 tertiary, 152.
 treatment, 154.
- Syphilis, congenital, 155.**
 diagnosis, 155.
 etiology, 155.
 pathology, 155.
 prognosis, 156.
 symptomatology, 155.
 treatment, 156.
- Tuberculosis of nasal passages, 143.**
 diagnosis, 144.
 etiology, 144.
 pathology, 143.
 prognosis, 144.
 symptomatology, 144.
 treatment, 145.
- Turbinated bones, anatomy of, 5.**
- Turbinectomy, 56.**
- Vasomotor rhinitis, 93.**
- Vomer, 4.**
- Zeim's experiments on animals, 76.**

SECTION II.—DISEASES OF THE PHARYNX.

- Abscess of the post-pharynx, 258.**
 tonsils, 244.
- Actinomyces, 306.**
- Acute bulbar paralysis, 320.**
- Acute infectious phlegmon of the pharynx, 261.**
- Acute pharyngitis, 231.**
 diagnosis, 233.
 etiology, 231.
 pathology, 231.
 prognosis, 233.
 symptomatology, 232.

- Acute pharyngitis, treatment, 234.
 Acute tonsillitis, 245.
 Adenoid growths in naso-pharynx, 204.
 diagnosis, 210.
 etiology, 206.
 pathology, 204.
 prognosis, 210.
 symptomatology, 207.
 general symptoms, 208.
 treatment, 211.
 operation by curette, 214.
 forceps, 214.
 galvanocautery, 213.
 Adenoma of the palate, 291.
 Advisability of general anæsthesia, 212.
 Anæsthesia of pharynx, 212.
 Anæsthetics, choice of, 212.
 chloroform, 213.
 ether, 212.
 ethyl-bromide, 213.
 nitrous oxide, 213.
 Anatomy of pharynx, 185.
 arteries, 190.
 faucial tonsils, 191.
 lingual tonsils, 192.
 nerves, 190.
 openings into pharynx, 185.
 pharyngeal glands, 190.
 pharyngeal tonsil, 190.
 Aprosexia, 209.
 Benign tumors of pharynx, 290.
 dermoid growths, 292.
 fibrochondroma, 291.
 fibrolipoma, 291.
 fibrolymphadenoma, 291.
 fibroma, 290.
 treatment of, 291.
 papilloma, 290.
 treatment of, 290.
 Carcinoma of the fauces, 311.
 diagnosis, 314.
 etiology, 313.
 pathology, 311.
 prognosis, 315.
 symptomatology, 313.
 treatment, 316.
 external operation, 316.
 internal operation, 316.
 Carcinoma of the naso-pharynx, 229.
 Catarrh of the naso-pharynx, 195.
 Chondroma of naso-pharynx, 230.
 Chronic pharyngitis, 237.
 Cleft palate, operations for, 454.
 Deglutition, 193.
 Dermoid tumors of the pharynx, 292.
 Diseases of the uvula, 252.
 œdema of the uvula, 252.
 etiology, 252.
 prognosis, 252.
 symptomatology, 252.
 treatment, 252.
 elongation of the uvula, 253.
 etiology, 253.
 pathology, 253.
 prognosis, 254.
 symptomatology, 254.
 treatment, 255.
 Fibroma of naso-pharynx, 223.
 diagnosis, 224.
 etiology, 223.
 pathology, 223.
 prognosis, 224.
 symptomatology, 224.
 treatment, 224.
 cold-wire snare, 225.
 electrolysis, 226.
 galvanocautery-écraseur, 225.
 Fibroma of pharynx, 291.
 Follicular pharyngitis, 240.
 Foreign bodies in the fauces, 321.
 prognosis, 323.
 treatment, 323.
 Hæmorrhage following tonsillotomy, 269.
 Hypertrophy of lingual tonsil, 284.
 diagnosis, 287.
 etiology, 285.
 pathology, 284.
 prognosis, 287.
 symptomatology, 286.
 treatment, 287.
 operative, 288.
 Lacunar tonsillitis, 272.
 Leukoplakia palati, 310.
 Lingual tonsil, hypertrophy of, 284.
 Lupus of pharynx, 297.
 diagnosis, 298.
 etiology, 297.
 pathology, 297.
 prognosis, 300.
 symptomatology, 297.
 treatment, 300.
 Malignant diseases of naso-pharynx, 227.
 carcinoma of naso-pharynx, 229.
 symptomatology, 229.
 treatment, 230.
 sarcoma, 227.
 diagnosis, 227.

- Malignant diseases of naso-pharynx,**
 sarcoma, etiology, 227.
 pathology, 227.
 prognosis, 228.
 symptomatology, 227.
 treatment, 228.
 by galvanocautery, 229.
 Bosworth's case, 229.
 Delavan's case, 228.
 Logan's case, 229.
- Malignant diseases of oro-pharynx,**
 307.
 carcinoma, 311.
 sarcoma, 307.
- Mycosis, pharyngeal, 277.**
 diagnosis, 282.
 etiology, 279.
 pathology, 277.
 prognosis, 282.
 symptomatology, 281.
 treatment, 282.
- Myopathic paralysis of fauces, 319.**
- Myxofibroma of naso-pharynx, 217.**
 diagnosis, 219.
 etiology, 218.
 pathology, 217.
 prognosis, 219.
 symptomatology, 218.
 treatment, 219.
 unusual cases, 221.
- Naso-pharyngeal catarrh, 195.**
 diagnosis, 199.
 etiology, 196.
 pathology, 195.
 prognosis, 199.
 symptomatology, 198.
 treatment, 199.
- Neuroses of the fauces, 318.**
 myopathic paralysis, 319.
 neuralgia of the pharynx, 318.
 neurosis of motion, 319.
 of sensation, 318.
 paralysis of the fauces, 319.
- Operations for cleft palate, 454.**
- Palato - glosso - pharyngeal paralysis,**
 320.
- Pharyngeal mycosis, 277.**
- Pharyngeal papillomata, 290.**
- Pharyngeal tuberculosis, 293.**
- Pharyngitis, acute, 231.**
- Pharyngitis, chronic, 237.**
 diagnosis, 238.
 etiology, 237.
 pathology, 237.
 prognosis, 238.
 symptomatology, 238.
- Pharyngitis, chronic. treatment, 237.**
- Pharyngitis, follicular, 240.**
 diagnosis, 242.
 etiology, 240.
 pathology, 240.
 prognosis, 242.
 symptomatology, 241.
 treatment, 243.
- Pharynx, anatomy of, 185.**
 boundaries of, 185.
 openings into, 185.
- Physiology of pharynx, 193.**
 soft palate, 193.
 tonsils, 194.
- Quinsy, or acute tonsillitis, 245.**
 diagnosis, 248.
 etiology, 247.
 pathology, 245.
 prognosis, 249.
 symptomatology, 247.
 treatment, 249.
- Retropharyngeal abscess, 258.**
 diagnosis, 259.
 etiology, 258.
 pathology, 258.
 prognosis, 260.
 symptomatology, 259.
 treatment, 260.
- Sarcoma of the fauces, 307.**
 diagnosis, 308.
 etiology, 307.
 pathology, 307.
 prognosis, 309.
 symptomatology, 308.
 treatment, 309.
- Staphylorrhaphy, 455.**
- Syphilis of the pharynx, 301.**
 diagnosis, 304.
 etiology, 302.
 pathology, 301.
 prognosis, 305.
 symptomatology, 302.
 primary, 303.
 secondary, 303.
 tertiary, 303.
 treatment, 305.
 deformities of pharynx, 306.
 mucous patch, 305.
 ulceration, 306.
- Tonsilliths, 321.**
- Tonsillitis, 321.**
- Tonsillitis, lacunar, 272.**
 diagnosis, 274.
 etiology, 273.

- Tonsillitis, lacunar, pathology, 272.
 prognosis, 275.
 symptomatology, 273.
 treatment, 275.
- Tonsillotomy by tonsillotome, 267.
 cold-wire snare, 270.
 curved scissors, 270.
 galvanocautery-knife, 270.
 secondary hæmorrhage, 369.
- Tonsils, faucial, 191.
 lingual, 192.
 pharyngeal, 190.
- Tonsils, hypertrophy of, 262.
 diagnosis, 265.
 etiology, 264.
 pathology, 262.
- Tonsils, hypertrophy of, prognosis, 266.
 symptomatology, 264.
 treatment, 267.
- Tornwaldt's disease, 203.
- Tuberculosis of pharynx, 293.
 diagnosis, 294.
 etiology, 293.
 pathology, 293.
 prognosis, 295.
 symptomatology, 294.
 treatment, 295.
- Uranoplasty, 456.
- Uvula, elongation of, 253.
 œdema of, 252.

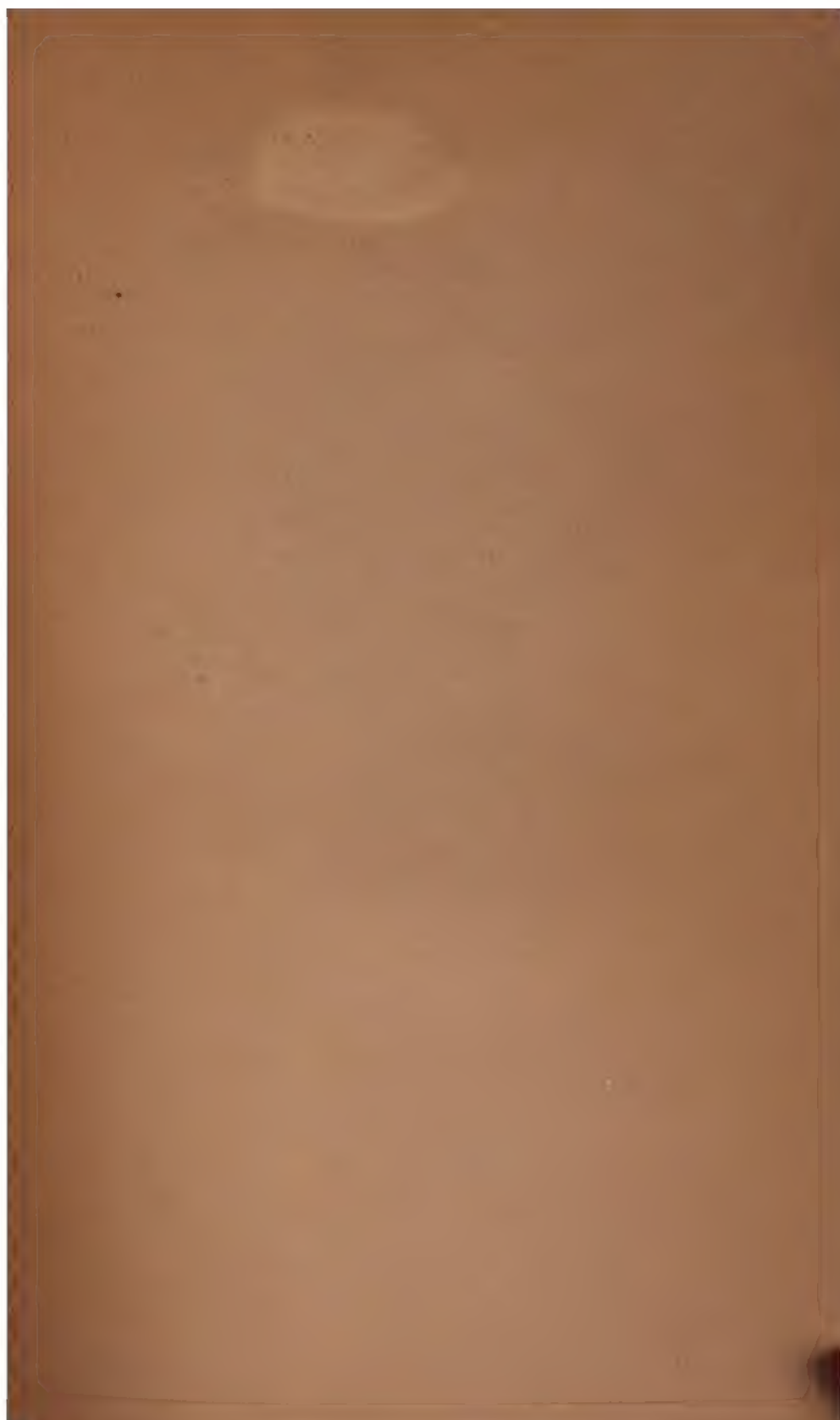
SECTION III.—DISEASES OF THE LARYNX.

- Abscess of the larynx, 395.
- Acute laryngitis, 362.
 diagnosis, 363.
 etiology, 362.
 pathology, 362.
 prognosis, 364.
 symptomatology, 363.
 treatment, 364.
- Acute laryngitis of children, 367.
 diagnosis, 368.
 etiology, 367.
 pathology, 367.
 prognosis, 369.
 symptomatology, 368.
 treatment, 369.
- Acute œdematous laryngitis, 371.
 diagnosis, 372.
 etiology, 371.
 pathology, 371.
 prognosis, 373.
 symptomatology, 372.
 treatment, 374.
- Affections of the cricoarytenoid articulation, 396.
- American nebulizer, 382.
- Anatomy of the larynx, 327.
 arteries, 335.
 arytenoids, 329.
 cricoid cartilage, 327.
 epiglottis, 330.
 ligaments, 333.
 lymphatics, 335.
 mucous membrane, 335.
 muscles, 335.
 nerves of larynx, 335.
 thyroid cartilage, 328.
 vocal cords, 333.
- Arthritic deformities of the larynx, 397.
- Atrophic laryngitis, 384.
 diagnosis, 385.
 pathology, 384.
 prognosis, 385.
 symptomatology, 384.
 treatment, 385.
- Autoscopy, 345.
 description of autoscope, 346.
 instruments for autoscopic work, 349.
 Kirstein's tongue-depressor, 345.
 position in autoscopy, 345.
- Benign growths of the larynx, 429.
- Carcinoma of the larynx, 436.
 diagnosis, 438.
 pathology, 437.
 prognosis, 438.
 symptomatology, 437.
 treatment, 439.
 endolaryngeal operation, 439.
 inoculation by erysipelas, 441.
 laryngectomy, 440.
 Solis-Cohen's operation, 440.
- Chorditis inferior hypertrophica, 390.
- Chronic blennorrhœa of Stöerck, 390.
- Chronic laryngitis, 377.
 diagnosis, 379.
 etiology, 377.
 pathology, 377.
 prognosis, 379.
 symptomatology, 378.
 treatment, 380.
- Cleft palate, operation for, 420.
 staphylorrhaphy, 455.
 uranoplasty, 456.
- Comminutor for inhalations, 383.
- Congenital syphilis of larynx, 420.

- Difficulties in laryngeal examination, 341.
- Diffuse pachydermia, 389.
- Diseases of larynx, 325.
- Fatal spasm of the larynx, 424.
- Fibromata of the larynx, 429.
- Foreign bodies in the larynx, 442.
 diagnosis, 443.
 prognosis, 444.
 symptomatology, 443.
 treatment, 445.
- History of a case of laryngeal perichondritis, 394.
- Intubation, 350.
 intubation-tube, improved, 353.
 in diphtheria, 353.
 in laryngeal stricture, 353.
 O'Dwyer's tubes, 351.
 operation during infancy, 351, 352.
 during adult life, 352.
 removal of the tube, 353.
- Kirstein's autoscope, 345.
 tongue-depressor, 346.
- Laryngeal manifestations of rheumatism, 397.
- Laryngeal perichondritis, 393.
 diagnosis, 394.
 etiology, 393.
 pathology, 393.
 prognosis, 395.
 symptomatology, 393.
 treatment, 396.
- Laryngitis fibrinosa, 392.
- Laryngitis, acute, 362.
 of children, 367.
 atrophic, 384.
 chronic, 377.
 œdematous, 371.
 tubercular, 398.
- Laryngoscopy, 340.
 author's operating-chair, 344.
 difficulties of examination, 342.
 position of the patient, 344.
- Leprosy of the air-passages, 410.
 anæsthetic form, 410.
 nodular form, 410.
- Leprosy of the nose, 411.
 larynx, 412.
 mouth and pharynx, 412.
 treatment of, 414.
- Lupus of the larynx, 406.
 diagnosis, 407.
 prognosis, 408.
- Lupus of the larynx, symptomatology, 407.
 treatment, 408.
- Malignant tumors of the larynx, 436.
 histological examination, 436.
- Multiple comminutor, 420.
- Multiple papillomata of children, 434.
 treatment by tracheotomy, 434.
 intubation, 434.
- Nervous aphonia, 422.
 symptomatology, 422.
 treatment, 422.
- Neuroses of larynx, 421.
 sensation, 421.
 treatment, 421.
- Neuroses of motion, 423.
 diagnosis, 424.
 etiology, 423.
 prognosis, 424.
 spasm of glottis, 423.
 symptomatology, 423.
 treatment, 425.
- Non-malignant tumors of the larynx, 429.
 cystomata, 430.
 enchondromata, 430.
 fibromata, 429.
 lipomata, 430.
 diagnosis, 431.
 prognosis, 432.
 symptomatology, 430.
 treatment, 432.
 papillomata, 429.
- Operations for nasal deformities, 449.
 Annandale's 450.
 Ellet's, 450.
 Roe's 451.
- Pachydermia laryngis, 387.
 diagnosis, 388.
 diffusa, 387.
 etiology, 387.
 pathology, 387.
 prognosis, 388.
 symptomatology, 388.
 treatment, 389.
 verrucous, 387.
- Papillomata, 429.
- Paralysis of the larynx, 426.
 etiology, 427.
 treatment, 428.
- Physiology of the larynx, 337.
 attributes of the, 339.
 function of phonation, 338.
 function of respiration, 337.
 Semon's theory, 337.

- Pseudomembranous laryngitis, 391.**
 recurrent, 391.
 traumatic, 391.
- Removal of foreign bodies from**
 œsophagus, 448.
 larynx, 445.
- Roentgen's rays in laryngeal surgery,**
 447.
 Crookes tubes, 447.
 sciagraph, 447.
- Simple œdema of the larynx, 375.**
 diagnosis, 376.
 etiology, 375.
 pathology, 375.
 prognosis, 376.
 symptomatology, 375.
 treatment, 376.
- Subglottic chronic laryngitis, 390.**
- Syphilis of the larynx, 415.**
 diagnosis, 417.
 etiology, 416.
 pathology, 415.
 prognosis, 418.
 symptomatology, 417.
- Syphilis of the larynx, treatment, 418.**
Syphilitic laryngeal stenosis, 419.
Syphilis, congenital, of the larynx,
 420.
- Thyrotomy, 358.**
- Tracheotomy, 354.**
 general anæsthesia, 355.
 high operation, 357.
 instruments used, 354.
 local anæsthesia, 356.
 low operation, 358.
- Tuberculosis of the larynx, 398.**
 diagnosis, 400.
 etiology, 398.
 pathology, 398.
 prognosis, 401.
 symptomatology, 399.
 treatment, 402.
 contra-indications of curette-
 ment, 403.
 curettement, 403.
 submucous injection in treat-
 ment, 403.
 tracheotomy and laryngectomy,
 403.
 treatment by electrolysis, 403.
- Verrucous pachydermia, 387.**





LAKE MEDICAL LIBRARY

This book should be returned on or before
the date last stamped below.

[illegible]

R46 Price-Jones, J.
P94 Diseases of the nose
1900 and throat. 85999

[illegible]

